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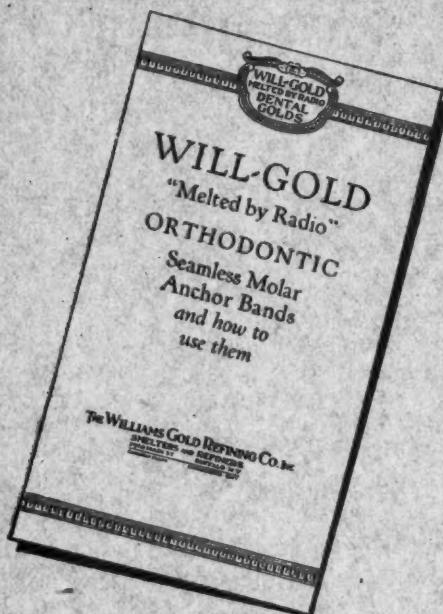
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ORIGINAL ARTICLES

MALOCCLUSION AND THE TEMPORARY DENTITION*

BY S. WILSON CHARLES, L.D.S., LONDON, ENGLAND

IT MAY be taken as a general rule that the temporary dentition foreshadows the permanent dentition. This is so universally recognized that it is unnecessary to bring forward any evidence to support the assertion. There are, of course, exceptions; an apparently abnormal temporary dentition may be replaced by a normal permanent dentition and vice versa. The exceptions to the rule are, however, not as numerous as they often appear to be. It is not necessary to stress the importance of the temporary dentition at a meeting of this society, but it is necessary to advocate the more extensive preaching of prevention both among the general public and among dentists. An appalling number of teeth are extracted every year, and an appalling number of mouths are ruined through ignorance or neglect; the extraction or premature loss of a temporary tooth should be an occasion for grief and not an event of no importance.

The fact that in the majority of cases it is possible to predict a subsequent deformity is of considerable importance, because it will then permit early treatment, treatment which may be so applied that it almost amounts to prevention. The theory that malocclusion is caused by mechanical influence alone, is now realized to be more or less incorrect; I am inclined to think that the production of an irregularity by purely mechanical means is quite exceptional, because it will usually be found that the individual is suffering from feebleness of growth in some form or other. It is obvious that a child may suck its thumb with great vigor, and that it may move the teeth in much the same way that they would be moved by an apparatus, but it can be shown that if you remove the cause the teeth will probably resume their proper position. On the other hand, suppose that the child has bones which are

*Transactions of British Society for the Study of Orthodontics.

affected by feebleness of growth, deficiency in lime salts, etc., it is more than possible that a permanent deformity may be produced. The term "feebleness of growth" has been used for convenience. It is now so familiar that no apology is needed; I use it with the meaning which Murk Jansen gives, namely, that any harmful influence which acts on the body affects the growth of the bones, and that the more powerful this harmful influence, or the more early it is applied, the more influence will it have on the growth of the individual concerned.

It is not easy to decide whether any particular case is influenced by this derangement in growth or no. I conclude as the result of observations on animals and children, that the two parents may influence the offspring in two ways. In the first place, by the handing down of certain characteristics which are peculiar to the family; these peculiarities, while abnormal in the majority of cases, may be considered as normal to the particular child. In the second place, by the quality of the cells from which they form the child. This is not a very good way of expressing what I mean, but it is so expressed for the following reasons: There is no doubt that parents as members of families hand on to their children, not only the characteristics of their families, but also the health of these families. In other words, both parents may come of what we usually call good stock or bad stock, or one may be good and the other bad. It is debatable whether this can produce what is called feebleness of growth in the case of the bad stock. It is of importance principally in the question of treatment, because it is obvious that a child coming from a bad stock is not so likely to respond to treatment as a child from a good stock, but affected by some accidental harmful agent.

How far one parent or even two can influence their offspring when they come of good stock but suffer from what we will, for want of a better word, call personal ill health, is another question, and strictly speaking only applies to the father, because a mother in ill health must of necessity affect the health of the child. I have taken a few paragraphs from a paper on Alcohol (*G. H. Gazette*, 22-12-23), by R. C. Brock, which show how very difficult it is to settle these questions and how very easy it is to make a mistake:

"In all social questions it is very difficult, almost impossible, to differentiate between cause and effect. Take for example the influence of the father's work on his children; a man is a tailor or a cobbler because he is not physically capable of being a blacksmith or a docker, and if his children are below normal it is because of his inferior physique and not because of his employment. That is, the *inherent mental and physical characters of the parents may be productive of the environment*.

"Or again, we may say if a woman goes out to work, her children suffer. That seems fairly clear. But is it? She probably goes out to work because her husband is not earning enough, and he is not earning enough because he is of inferior physique or intelligence, and his children would be inferior whether the mother went out to work or not. Actual statistics (in 1910) show that where the woman does not go out to work the average wage of her husband is 26s. 2d.; where the woman does go out it is 22s. 4d.

"Thus we see that all the possible factors, direct and indirect, are hopelessly mixed up, and I am laying stress on this to show how broad-minded and careful one has to be."

This question is perhaps more academic than practical, and yet, as I have said, it may have an important bearing on treatment. The influence of harmful agents, which are productive of feebleness of growth, does not come into the question until the formation of the embryo, and how far or at what stage a harmful influence may affect the embryo or fetus is difficult to decide.

It is usual to describe the fetal mandible as being so arranged that the body and the ascending ramus are more or less in one straight line. This is obviously not correct; place the fetal head so that the Frankfurt plane is in the horizontal plane, and the mandible will be seen to make an angle of something like forty-five degrees with the horizontal. The picture we get of the mandible is very different from that when its lower border is allowed to rest on the table. As the mandible grows it is pushed forward and downward by the additions to the base of the cartilaginous wedge, and the tooth sacs or teeth rise so that what we may call the occlusal plane is constantly altering its position. The teeth therefore occupy a different arch at each successive period of growth.

It is possible, when one looks at the mandible in this light, to determine with almost mathematical certainty what will be the result of interfering with growth. A gross interference with growth at the base of the wedge after the 55 mm. stage will obviously result in a very deformed mandible; slight or relatively slight interferences may result in a mandible which is slightly distal to normal. The growth which takes place along the main line of growth is quite independent of that which constantly alters the level of the occlusal plane of the teeth and, moreover, is independent of any forward growth of the bone supporting the teeth. This may be better expressed by stating that the teeth are carried forward and downward by the main growth of the mandible, but that they move upward and forward relative to this main line of growth and independent to it. As an illustration one may get a case in which both chin and teeth are postnormal, but one may also find many cases in which the teeth are postnormal and the chin is normal. Again, the chin may be markedly postnormal and the teeth only very slightly postnormal. This introduces a much larger question: the growth of the mandible and maxilla relative to the bones of the skull. The difficulty, practically the only difficulty, is the finding of a fixed point from which to make measurements.

I have digressed somewhat from my original argument about feebleness of growth. When I first started this work I anticipated that by the examination of microscopic sections one would be able to determine the effect of harmful agents on bone growth, that there would be a marked difference between healthy or normal bone and unhealthy bone. Many difficulties have been encountered which it is hoped will be successfully overcome. At first I tried dogs, but I had a difficulty in collecting material which was reliable; then I was fortunate to obtain a fair amount of human material, but it has not been as easy to make deductions from it as it would appear. In a short

acute illness which is fatal the bone has not had time to become affected, and in the chronic disease it is necessary to examine specimens from different parts of the body before any deduction can be made. I have come to the conclusion that by using rats, or perhaps dogs, as controls, it may be possible to definitely determine the influence of any harmful agent. When I say control, I mean animals which have been suffering from disease, not normal animals.

The other method which one may adopt to see if any light can be thrown on the problem, is the method which was adopted by Murk Jansen; the examination of families, the members of which have been born in quick succession, and where the mother has not been able to live under those circumstances which are necessary for the rearing of healthy children. Mr. Chapman dealt with this method in his presidential address last year so fully that there is nothing for us to do now but produce family histories to add to his collection. I have examined a fair number of families, and I will show models of certain members of those families to illustrate various aspects of the question.

The influences which I have tried to determine are those which I spoke of at the commencement of this paper.

1. The characteristics of the family which may be handed down to any or all the children.
2. The influence of good or bad stock upon the children.
3. The influence of the father's health when he comes of good stock.
4. The influence of the mother's health when she comes of good stock.
5. The influence of acute and chronic disease after birth.
6. The effect of mechanical influence upon children suffering from feebleness of growth and those who are not.

The tentative conclusions one comes to are as follows:

That feebleness of growth must be considered as a probable cause of malocclusion, but that it is necessary before doing so to eliminate the influence of heredity, with which must be associated the influence of bad stock, family characteristics, and certain evolutionary tendencies. [In the course of a few generations, breeders can change the appearance of animals so that they can hardly be recognized; this may or may not have some influence on malocclusion, especially in the crossing of dissimilar types.]

That, generally speaking, mechanical influences are not the cause of malocclusion. Amniotic pressure is unlikely to cause it, except in extreme cases; injury at birth would not appear to do so, unless the injury is of so grave a character that bones are definitely damaged, and this can hardly be considered as malocclusion.

That mechanical influence on the teeth and jaws of a child suffering from feebleness of growth may cause malocclusion, but this same influence applied to a normal child would, or might, act as an apparatus for the correction of malocclusion—namely, it might move the teeth or alter the jaws, but on the influence being removed the teeth or jaws would tend to return to their original position.

On the other hand, many healthy children subject their teeth to various mechanical influences (thumb-sucking, etc.) without any bad effect. Experiments and experience prove that animals and children subjected to harmful influences after birth, recover from them with a fair chance of there not being any permanent injury if the influence be not effective for too long a period; but that when the harmful influence has operated before birth, the chance of permanent recovery is lessened considerably. There is in this case no comparison between prevention and cure; there is only prevention.

DISCUSSION

Mr. Harold Chapman said he was extremely pleased that Mr. Wilson Charles had taken on the task of investigating the etiology of some of the cases of malocclusion. The first four cases he had shown were most interesting. He had said that the children were brought up under miserable conditions, but he had not gathered that Mr. Wilson Charles had given any other factors, so that he imagined there were no harmful influences there. Although the conditions in which the children were brought up might be miserable, he did not regard them as harmful. It seemed to him that they must have come of good stock, and that the parents lived in healthy surroundings. Mr. Friel had told him several times that in one district in Ireland—he did not remember which it was, but Mr. Friel would be able to tell the members and correct him if he was wrong—where the people were very poor, their diet consisting almost entirely of potatoes and very little meat, the occlusions were extraordinarily good. That did seem to point to the fact that if the surroundings of the people were really healthy, tending rather toward the country life than toward the urban or city life, the chances were very much better. He himself had just had the opportunity of being in the South of France for several weeks and there he had not noticed any marked deformity in the children as he walked about the streets. It was very different from what one observed in this country. There again probably, although the children were brought up under miserable conditions, conditions which we in this country would certainly regard as miserable, seeing that in the streets in which the people lived the sun had never entered for several hundred years, and in some cases a thousand years, still the population led an open-air life, and he supposed they got plenty of sunshine outside their own homes. He would have liked Mr. Charles to have given a little more detail than he had done, but still it was very valuable to have these cases brought forward in an attempt either to prove or disprove the views he had brought before the Society last year. He thanked Mr. Charles very heartily for having undertaken that work, and he hoped that at some future time he would go into more detail than he had on this occasion.

Dr. Sim Wallace said he had been much interested in Mr. Wilson Charles's work, and he was glad to see that on the whole he seemed to be more or less a follower of Murk Jansen. Was that so?

Mr. Wilson Charles: Yes, that is so.

Dr. Sim Wallace said he had nothing particular to say, but with regard to the harmful influences, he really thought it very largely came to a question of those harmful influences which resulted from an extraordinarily unsanitary diet in vogue among civilized beings. The particular illnesses that children took might not be in themselves of very much consequence with regard to the development of the jaw, but the resulting persistent loss of mechanical stimuli seemed to him to be at the root of the imperfect development of the jaw bones. He had just come home from Rangoon, and as he wanted to know what children ate there, he prowled about in the native quarter, but there he found hardly any "civilized" sweets. The principal "sweets" that the children seemed to indulge in were little bits of sugar-cane. About half of the crew were Lascars and the other half Englishmen with dentofacial deformities predominating. He had to examine the crew, and naturally looked into their mouths to see their teeth and their tongues. It was not difficult to see the teeth of the English part of the crew because they frequently fell down; some had their own teeth, but the condition of their mouths could hardly be considered satisfactory, to say the

least of it. The teeth of the Lascars, however, were relatively very good. A noticeable thing about their mouths was that they had well-worn teeth. They had ground down their teeth somehow; whether they might attribute it to the nature of the food or not, it seemed to him indubitable that their teeth had been thoroughly well used, and he believed that that use started in very early life. The arches, on the whole, were very regular, and he believed that, as children, their mouths were far freer from sepsis than those of the average well-brought-up child that in later life went to Eton or Girton. The chief harmful influence, he thought, that was responsible in England for deficient bone development was ladling soft food into children and getting them into the habit of not masticating properly. He was sorry he had not anything more to contribute, but he thought that what Murk Jansen had been saying about the growth of bone pretty well solved the whole problem.

Mr. Friel said that the children he examined in the West of Ireland certainly had the most beautifully developed jaws, but they had a very considerable amount of decay or caries, and they had very inflamed gums, and he did not think Dr. Sim Wallace could ever say that their diet was very suitable; it was practically all potatoes.

Dr. Sim Wallace: Good enough.

Mr. Friel said they ate an enormous quantity of potatoes—cooked potatoes; but they had very bad caries and very inflamed gums, but beautifully developed jaws. The only things he could find out about them was that they lived a good deal in the open air. Their houses were most unsanitary; they slept with no ventilation. In recent years the houses had all been slated or had zinc roofs put on them by the Government, and they had done away with the thatched roof, which used to give a very considerable amount of ventilation, whereas they had none at all at present.

Mr. Norman Gray said he would like to ask Mr. Charles if he had any experience of rickets. Dr. Hatfield had examined some four or five hundred cases, and to the surprise of everyone, instead of finding undeveloped arches they were generally very well developed. Perhaps Mr. Charles could say something about that.

Mr. H. C. Highton said he wished to refer to Mr. Wilson Charles's description of cases where one got a deformity which was due probably to feebleness of growth, and not, perhaps, to mechanical action playing a great part. He said that because he had a family of five children under observation, all brought up in the same environment. The two elder children were bottle-fed and later lived on a fairly soft diet, and were allowed pretty much to choose their own food, and to go their own way; they were not limited as regards sweets. He had not had a chance of seeing their temporary dentition, but they had developed perfectly good arches, free from caries, and were both well-developed children. The three younger children were breast-fed and brought up on a fairly hard diet, and the soft food was eliminated. Those three children were more or less undersized, and had not nearly such good arches as the elder two children. One showed definite signs of irregularity, and they all had a fair amount of caries, and those were children of the same family, brought up under the same conditions as the others.

The President said he would like to add his quota of thanks to Mr. Wilson Charles for his paper. The cases were very interesting, presented as they were, from different points of view, and they had led him to think that one could raise a study and produce statistics to prove anything. The four models which Mr. Wilson Charles had shown on the screen first had interested him more than any of the others from their similarity of development anteroposteriorly, and the fact that they were practically free from caries and showed good development. There was one important point which Mr. Charles had not mentioned at all, and that was whether the children whose models he had shown were survivors of large families. He imagined that the four children, or the four adults as they were then, from their dentition might have been the survivors of a large family, and one came back to that dreadful old saw, the "survival of the fittest." One or two of the speakers, among them Mr. Chapman and Dr. Sim Wallace, had mentioned the effect of rural life as against urban life. His own experience was that there was nothing in that. He had practiced in the country for over twenty years, and also in the town, and the dentition of the country child under the same financial conditions was just about the same.

He thought it was worthy of notice in connection with Mr. Chapman's remark with regard to the children in that part of France to which he went, that very serious regard must be paid to the diet. They possibly had very little sugar in the form of chemical or commercial sugar as used in England. Their drink possibly was a rough, crude wine; they did not take such farinaceous food as English children did, and they foraged for their food very largely, and those who saw the poor child in the hospital practice, who came with a clean healthy mouth (and many of them did) would agree that the children who survived were those who had to forage for their food. There was never enough, but if they lived to the time when they could develop a secondary dentition it was going to be a good one very often. The child who was pampered and fed on soft pappy mush ought not to expect a good dental development. Combined with that, he thought regard must be had to parental responsibility in those matters. A good many people were very fond of talking about teeth, but they disregarded very largely the other physical developments—and how many of their patients who came to them with malformed dentition were not malformed in any other way? The subject of bone growth, of course, was to him particularly interesting, and he was more than satisfied to feel that one or two speakers thought that Murk Jansen had solved the problem. As far as he understood it, from what he had read both of Jansen's work and that of Wolff and every other bone man that had written, they knew very little more about bone growth than Hunter did, and he thought there was a lot to come yet. In conclusion, he thanked Mr. Wilson Charles for his very interesting paper, and those who had spoken, for their contributions to the discussion.

Mr. Wilson Charles, in reply, said he must apologize for the haste in which he went over the various cases. There was a lot he might have said about each one. With regard to the first one he had shown, the children were from a family eight in number, one of whom had died. The four were the younger members of the family. The eldest one was twenty and the youngest about fourteen, and they had lived under miserable conditions. He ought to have enlarged on that, of course. Their father was so poor, owing to the conditions under which casual farm laborers lived in those days, and apparently still did, that he had very great difficulty in making ends meet. He was very often on the sick list, but he could not think that that was due to anything more than an accident. He did not think the man could have been of bad stock; he must have been a perfectly fit man, but that his illness was more or less accidental, and the children, he knew, were very often in the habit of going to the fields to get turnips, etc., to eat. Dr. Sim Wallace had introduced the question of Indians and the like. He had resisted the temptation, when he was writing the notes for his paper, to discuss the question of diet, and he did not think he ought to enter upon it then. He had lived for three years in East and Central Africa, and had considerable experience, or at least a fair experience, of primitive tribes—that is, as primitive as one could get them today—and he was not at all sure that current ideas about diet were quite correct. He was perfectly certain that there was something besides soft food which was influencing the question. There were many tribes in Africa which had really wonderful mouths, and never ate anything but soft foods. For instance, the Buganda lived principally on bananas, which were certainly soft enough. Mr. Friel had mentioned about the inflamed gums and caries of the West of Ireland. That reminded him of large numbers of native tribes which he had examined, where one often got pyorrhea, which, of course, might be due to soft food, but it occurred even in those cases where they took hard food, so it was a little difficult to decide what was the cause. Mr. Norman Gray had asked a question about rickets. He was doing work on that at the present time, but he was afraid at the moment he was really not in a position to say much about it. Mr. Cale-Matthews had mentioned the question of rural life. Most of the children whose models he had shown had lived in the country all their lives.

FUNCTIONAL ABNORMAL OCCLUSION*

BY NORMAN G. BENNETT, L.D.S., M.B., B.C.H., LONDON, ENGLAND

I AM AFRAID this communication is not a "paper," and that I shall not utilize all the time provided by the secretary, but I venture to hope that if the opinions I express are sufficiently unorthodox, then I may succeed in provoking a discussion that will serve the purpose equally well or better. In the practice of orthodontics it is a great thing to have high ideals, but it is sometimes very undesirable to act upon them. It must happen to all of us that patients present themselves with some slight abnormality, and the question arises whether treatment is worth while. If it were the case that the degree of abnormality might be taken as a measure of the difficulty of treatment and the amount of time required, there need be few cases in which a slight abnormality would be left untreated, and the ideal result not obtained, but we know that this is not so. In some cases of fundamental abnormality such as a postnormal mandibular occlusion, we know that a perfect result can sometimes be obtained by an inclined plane to "jump the bite," with or without a slight widening of the maxillary dental arch. On the other hand, a partial rotation of a lateral incisor may require for its correction a somewhat elaborate fixed appliance to move other teeth in order to make correction of the lateral incisor possible, and also to rotate the lateral itself. The question then arises, is the game worth the candle? One could mention many other examples, such as a buccally misplaced mandibular molar, or a maxillary premolar which cannot quite take up its correct position in the arch.

But it is not so much these trivial abnormalities that I wish to speak about as the more fundamental errors in occlusion. We know that in cases of postnormal mandibular occlusion it is not so much the occlusion itself which may be a disadvantage to the individual, as the consequences of it, or other correlated conditions. Postnormal occlusion may be functionally quite as useful as normal occlusion, but we know that it is frequently associated with a narrow maxillary arch or with a deep over-bite, either of which may or may not be detrimental, or with superior proclination, or with retroclination of the maxillary central incisors and narrowness across the arch in the canine region.

The illustrations show you the models of two boys whom I have known from infancy. At various times I have had to consider whether it was desirable to interfere with nature, and have always decided to the contrary. Some of you will no doubt think that I decided wrongly.

Now I think we are too much inclined to regard what is usually recognized as normal occlusion as something which appertains to the human race throughout the ages. Ought we not rather to regard it as a phenomenon of

*Transactions of the British Society for the Study of Orthodontics.

the present day? We know that paleolithic and neolithic man had an edge-to-edge bite of the incisors similar to the anthropoid apes, and that the present form of occlusion in white races is a comparatively recent development. Primitive races like the negro have the mandibular incisors biting just behind the maxillary incisors, but I think you will find that the amount of overlap is less than in white races. As the mandible goes back, the degree of overlap increases. Have we any right to regard so-called normal occlusion as a fixed relationship or to say that a new relationship is not



J. D. S., Oct., 1916,
at. 4 $\frac{1}{2}$

J. D. S., Jan., 1922,
at. 9 $\frac{1}{2}$

J. D. S., Jan., 1927,
at. 14 $\frac{1}{2}$

being gradually evolved? When we observe some of the other conditions constantly associated with postnormal occlusion—narrow maxilla, extreme proclination of maxillary incisors and so forth—we say that these are obvious abnormalities and must be regarded as pathologic, although we do not know what the causes are. But in the two cases that I have shown there are no gross abnormalities. In the one there is slight overlapping in the maxillary incisor region chiefly on one side, and in the other there is retroclination of the maxillary incisors. In both there is a deeper overlap than usual, but I am not sure that we are justified in regarding that as pathologic. In the

former case the condition could only have been "corrected" on reasonable lines by moving all the maxillary cheek teeth backwards, and if this had been done to the extent of one unit, too much space would have been gained. In the latter the conditions could only have been corrected by moving forward the maxillary incisors and "jumping the bite" to the extent of one unit. I believe that the result would have been ugly. The boy has a long narrow face and the retroclination does not look unnatural. The result of treatment



G. G. B., Oct., 1921,
at. 11

G. G. B., Jan., 1927,
at. 16 1/2

would have been proclination of the maxillary incisors to allow of correction of the occlusion of the cheek teeth, and a possibly unnatural forward position of the mandible, if it be assumed that the treatment would have been successful.

There is some fundamental difference between cases of postnormal occlusion associated with superior proclination and superior retroclination. If the difference consists simply in tilting forwards or backwards of the maxil-

lary incisors, then there should not be much difference in the difficulties of treatment. We know, however, that the second class is the more difficult to treat successfully. For instance, in cases of proclination, when it is decided not to advance the mandible a remarkably good result can often be obtained after extraction of the maxillary first premolars. But in cases of retroclination similar treatment would usually be disastrous. I think that the difference may consist in the relationship of the dental arch to the maxillary base, and that in cases of retroclination it is somewhat further back. This would also explain why they cannot be corrected by advancing the maxillary incisors and "jumping the bite," without producing some degree of proclination.

Now the point that I want to put before you is this. Are we justified in saying that cases like these two are abnormal or pathologic and not evolutionary changes in a sort of half-way stage? There are two considerations of detail that bear upon this question. Both these boys have small maxillary canines. I think there is no doubt that the size of the maxillary canines (and perhaps the mandibular ones) relatively to the other teeth is a diminishing quantity. Moreover I think that small canines are most often found in children of high mental development and that they then erupt at an unusually early age. This earlier eruption is to be expected, because, as we know, the late eruption of the canines in anthropoid apes is correlated with their use as a sexual weapon. Again, if we are asked to say what is the most usual kind of slight abnormality to be found associated with normal occlusion and tolerably well developed dental arches, I think most of us would say some degree of imbrication or overlapping of the mandibular incisors. If this is true it indicates that the maxillary arch is gradually becoming too small for the mandibular, and nature can best make the necessary correction by placing the mandible a little farther back. If this occurs to the extent of one unit, then there may be some overlapping of the maxillary incisors, but the diminishing size of the maxillary canines tends to neutralize this. I have advanced what you will probably regard as a fantastic hypothesis, but I would remind you that there is nothing necessarily fixed about so-called normal occlusion. Postnormal occlusion occurs in some of the lower animals. For example, I think the lemurs exhibit it, and it is interesting to reflect that they and the monkeys are closely related. Perhaps other members of this Society have cases similar to those that I have shown. I cannot help thinking that if we all kept our eyes open for cases of postnormal occlusion which are functionally effective and in which no correlated gross abnormalities exist, we might obtain material by which we might in some degree be able to picture the evolutionary changes which are still proceeding in man. We might even, while still regarding normal occlusion as a useful present-day working hypothesis, cease to regard it as an unalterable ideal.

DISCUSSION

The President, Mr. H. C. Highton, said the two cases which Mr. Norman Bennett presented at the last meeting and described as having functional abnormal occlusion, despite the fact of both being postnormal, opens up a wide field for discussion, and also the question

of the desirability of treatment. These cases would come under Angle's Class II, Division 2, and are usually associated with retroclination of the maxillary incisor teeth, a practically normal development of the chin and an absence of mouth breathing. I understood from the description of the cases by Mr. Norman Bennett that the profile was fairly normal, but I don't think he mentioned the question of mouth breathing or any pernicious habit that might have had an influence in producing the condition. The variation from the usual type of malocclusion associated with these cases appeared to be the absence of any inclination of the incisor teeth. In the first flush of enthusiasm in the treatment of cases of this type one was often tempted to embark on complicated treatment to obtain so-called normal occlusion, which we now realize as being rather what might be termed ideal occlusion, but which might not be exactly ideal for that particular case. It was often with this type of case that the operator was apt to get out of his depth, and to add considerable worries and troubles to the treatment without being able to accomplish any improvement, quite apart from the long duration of treatment and possible damage to the tissues. Hellman has pointed out in his articles that it is often advisable not to attempt treatment in certain cases, or at least to minimize it as much as possible, and I think the consensus of opinion in orthodontics is rather tending towards allowing the normal process of development to operate where a functional occlusion will be obtained without any marked degree of deformity. We recognize nowadays that there is such a thing as a natural disharmony, and that certain irregularities of the teeth do not necessarily constitute a deformity in the sense of being the result of a perversion of physiologic processes. I suppose we must admit that retrogressive changes are taking place in the human face and dental arches, and that evolution is partially responsible, but the method of their occurrence is still a matter of great doubt and a subject that will require years of research. Animals are known to be born with deformities, but the law of the survival of the fittest usually applies, and only those that are free from any marked degree of deformity survive, whereas in man where jaws and teeth are not of anything like the same relative value, a survival of grosser types of deformities is common, and the extreme perversion of the function of mastication would appear to have an influence on the evolution of the masticatory apparatus. Treatment in these cases should include a knowledge of, and a complete elimination of, the factors expressed in the deformity, but as yet we know so little of the etiology of malocclusion. By way of criticism, I should like to say that I made the query at the last meeting, which I should also like to repeat, that it appeared to me that the worst feature of the final models shown was the rather extensive overbite, and I should like to know whether Mr. Norman Bennett does not consider that this would have been very much improved if simple general expansion of both arches had been undertaken at an early age, also it appears to me that it would have relieved the slight crowding which has occurred in the incisor region. I should also like to ask Mr. Norman Bennett whether he had any particular reason at the back of his mind when these cases first presented themselves for refraining from treatment; and whether, had there been any inclination of the incisors, it would have altered his line of action. Mr. Bennett has brought forward an extremely important and interesting subject for discussion which involves many questions. I am sure there must be many members present who will wish to make remarks on these cases, and who perhaps have had experience in their treatment, so I trust we shall have a good discussion.

Mr. Pitts said he had not had the pleasure of listening to Mr. Norman Bennett's paper, but he had read it with great interest. He had brought a model of a case which he thought was a type of abnormal functional occlusion, and would show it on the screen. The child was a girl of about twelve years of age or a little over, who attended at the Royal Enfield Hospital some few years ago, and Mr. Bennett had actually seen her at the time, as she was one of the children they had had up at one of the prize examinations. The model (shown on the screen) showed the lateral occlusion. There could be no doubt about the condition being quite definitely postnormal, and it would be observed that there was a corresponding degree of maxillary retrusion, but that there was no bunching up of the maxillary incisors. He thought that point would be better brought out by seeing the actual models themselves. It would be seen from this model that there was no bunching up at all of those teeth.

The mandibular incisors were not actually biting the palate, however. There was a definite space of about a millimetre, and he did not consider that there was any very marked degree of overbite. The next slide showed the photograph of the child in profile. He thought one must admit that, looking at the profile, one might be sure that there was some postnormal occlusion present. The chin was not very well formed, but actually it was not so noticeable in the child as it was in the photograph. In the photograph the head was rather bent forward, which he thought rather accentuated the condition. The case was one in which, if one were going to drag it into Angle's classification, one would have to say that it was Angle's Class II, Division 2, because the maxillary retrusion harmonized with the mandibular retrusion, but the maxillary incisor teeth were completely even. If any treatment were to be adopted for that case, the only possible thing would be to expand the maxilla anteriorly and push the teeth out in the hope that the mandible would follow. He felt quite sure that had such treatment as that been adopted the esthetic results would have been good. The child did not suffer in any way from the condition. The maxillary incisors were not visibly abnormal: the lips were of normal length and were kept closed, and, as so often happened, she had just as good a working occlusion for the purposes of mastication as any other child with an ordinary normal molar occlusion. That was a good case, he thought, which corresponded exactly to the two which Mr. Norman Bennett had described, a case for which nothing at all should be done in his view. Mr. Bennett had raised a very interesting question as to whether those cases foreshadowed an evolutionary change, whether they were, as it were, the forerunners appearing out of due time now to such an extent that they could be called abnormal, but whether at some time in the far future they might become the relatively normal. It was very interesting to speculate as to what form evolution would take. The great thing about it was that no one could contradict the speculators, except perhaps some one who read the *Transactions* of the Society some fifty thousand years hence; but he must say that although he had had the opportunity of seeing a lot of children, that was the only case of that type that he had seen at all. The so-called Class II, Division 2 cases were not particularly common, but in all the other cases he had seen, there had been a very definite bunching up of the maxillary incisors, often of a rather ugly character, and calling for some correction. He had seen a great number of cases of postnormal occlusion in very young children—children of two or three or four years of age—but again he had never seen a maxilla that was well formed and well aligned just in the same way as the case he had described. If there was an evolutionary change going on one would certainly rather expect to find cases of that type more common, and yet it might be that his experience had been unfortunate. At any rate that particular one was the only one he had ever seen. Bearing on the other question, as to whether we might be arriving at a postnormal occlusion as the general thing, he must say that he found himself increasingly adopting that as a working rule, and unless the profile very definitely showed a recession of the chin which was conspicuous, he usually ignored the postnormal occlusion. He diagnosed it as such, and then proceeded to ignore it for the purpose of treatment, and to treat the case as though it were one of superior occlusion only, and leave the postnormal occlusion to take care of itself. He believed that it provided the child with just as efficient a means of mastication as a normal neutral occlusion. He did not do that in every case, because there were many cases in which some treatment of the mandible was called for; but in an increasing number of cases he did, because he found that in such a large number of cases the chin, if not perfect, was at least moderately well formed. It was, he thought, a rather remarkable thing that in the case of Class II, Division 2, where one got both normal molar occlusion just as marked as in Class II, Division 1, in nearly all cases the chin did appear to be quite well formed, and very rarely needed any treatment. In conclusion, Mr. Pitts said that he thought Mr. Bennett had done a great service in reading his paper, and in bringing those cases before the Society, because he thought that not only was it an interesting speculation, but it should sound a note of caution as to the necessity of treating all cases of postnormal occlusion merely because they were postnormal. Mr. Pitts then handed round his models.

Mr. Cale-Matthews said the paper which Mr. Norman Bennett had given was so practical a one that any discussion from a critical point of view was difficult. The cases he had

selected as examples were, from the attitude he had taken, difficult for the listener to discuss. It must be remembered that both these boys had been under observation from early childhood, and we have not been given the opportunity of seeing any photographs which may have helped in forming an opinion. Mr. Norman Bennett assures us that both patients have long narrow faces and the profile is good despite the postnormal occlusion. It should be remembered that the models shown are on a flat plane and, as is usual, there is no means of judging the occlusal plane in relation to the base of the skull or the general facial aspect. This was exemplified in the two models and photographs which Mr. Pitts had just thrown on the screen in discussing the paper. There was a marked dissimilarity in the facial contour of the two photographs, but Cale-Matthews assumed that the photographs were taken at the same time?

Mr. Pitts: Yes.

Mr. Cale-Matthews continuing: Cases of postnormal occlusion of the type shown by Mr. Norman Bennett would fail in treatment for permanency of correction unless a due regard was given to the occlusal plane as distinct from the postnormal occlusion. It would be found that there was an invariable tipping forward of the first permanent molars in the mandible and a lack of vertical growth in the premolar region, also an elevation of the mandibular incisors in that relation, and so far as he knew where treatment was undertaken to reduce the postnormal occlusion success was not obtained unless a reduction of the excessive curve was established. Combined with that, due care should be taken to observe the position of the superior canines; a reversion in this type of case was often due to a narrowness in the canine region. These points have been brought out in some of the earlier orthodontic writings and particularly in Angle's earlier arguments, and only on those lines could one hope to attain permanent success in the treatment either of unilateral or bilateral postnormal occlusion cases. Had it not been that the programme for the evening was already full he would have brought forward several models which would have strengthened Mr. Norman Bennett's argument. Not only did he agree with him in leaving many of those cases untouched as far as the postnormal occlusion was concerned, provided always that the facial appearance was good, but in actual treatment unless there were other complications he thought it often wiser not to interfere with good molar occlusion. Experience in the practice of the correction of abnormalities of occlusion impressed him with the danger of interfering with a really good molar occlusion, and particularly in those cases which might be described as on the border line of normal and postnormal occlusion. There was a marked difference in the second pair of models illustrated in the paper in regard to the amount of overbite and prominence, and also in the space between the superior canines. He quite agreed that it may have been too particular treatment to have attempted any interference with the lateral and central incisor into the more regular occlusion. In making a diagnosis of these cases and bringing the mandible into the correct occlusion it was necessary to be particularly careful to avoid the chin becoming a dominating factor in the facial occlusion. This was particularly noticeable, he thought, in the two photographs shown by Mr. Pitts. He thought the Society was indebted to Mr. Norman Bennett for bringing the subject before it, and he thanked him very much. There was much more to be said, many points to be discussed, and it would be quite easy to write another paper in reply which could bring forward many minor points which Mr. Bennett had purposely avoided. In connection with this type of case Mr. Bennett uses the following phrase: "There is some fundamental difficulty between cases of postnormal occlusion associated with superior proclination and superior retroclination." Most dental surgeons had learned what these were in the earlier teaching of Angle, and now they were trying to get away from that arbitrary classification, it was found they were opening up a very wide and difficult problem. The cases which Mr. Bennett had purposely avoided treating were those in which there was a narrow maxilla and well-developed but flattened mandible with postnormal occlusion. Those cases were the most to be dreaded; much more so than any individually displaced teeth coupled with a postnormal occlusion.

Mr. Pitts said if he might intervene again he merely used his "if" with regard to the evolutionary change suggested by Mr. Bennett without suggesting that evolution had come to a standstill.

Mr. Badcock said that whether or not retroclusion was going to become normal occlusion, it seemed to him a great deal more common than it used to be. He seldom entered an omnibus without finding at least one of the passengers the subject of that condition, and very often there were two or three. As to its treatment, he fully agreed with Mr. Bennett that there were cases where no treatment was necessary. He did not think they were very common, but he could recall one or two, and as a matter of fact he had one under his hands at the present time where the only treatment needed was the rotation of two twisted laterals. There was one little point in Mr. Bennett's paper which rather astonished him, and that was his statement that the removal of the first maxillary premolar in the case of Angle's Division II would lead to disaster. It had always seemed to him that those were particularly the cases where the extraction of the first premolar was the most successful, particularly if done early. If one extracted the first premolar as soon as it appeared the canine would fall back into place, and generally no other treatment was necessary. It might be that he had misread Mr. Bennett, or that he had not quite remembered what he had said. In conclusion, he wished to add his sincere thanks to Mr. Bennett for the paper, which was most stimulating, as Mr. Bennett's papers always were.

Mr. H. Chapman said that like Mr. Pitts, he was not in the fortunate position of hearing Mr. Bennett's paper, and he had only read it during the past week, but just before he did so he saw a child whom he had been treating for a couple of years, and had produced the condition more or less represented by "J.D.S." in the illustrations, and curiously enough he had advised that the treatment might cease at that particular point. He really mentioned that to show that he agreed with previous speakers in believing that functional occlusion, even if it were abnormal, might be very satisfactory and perhaps be preferable to treatment to produce a functionally normal occlusion. The point which Mr. Badcock had referred to also occurred to him, and he wondered whether Mr. Bennett had said what he intended to say there—that was with regard to the extraction of the first maxillary premolars in cases of Class II, Division 2. He himself had treated several of those cases, especially in older patients, about fourteen, or fifteen years of age, where the laterals were prominent, which was very frequently seen in these cases, by removal of the first premolars, either one or both of them, according to the conditions, and bringing back the canine and depressing the laterals so as to come into line with the central and canine. There was one other point to which he wanted to refer, and that was with regard to the smallness of the canines, not so much that he wanted to mention that, but he recalled that when he was making investigations into the histories of children where there were brothers and sisters in the same family, one being a normal occlusion and another in Class II, Division 1, the Class II, Division 1 children were more brilliant mentally than the others, although the others were probably the more methodical and harder workers, and might succeed better in after life; but superficially it appeared that the others were more brilliant. He, too, wished to add his appreciation of Mr. Bennett's paper, and to say that anything he (Mr. Bennett) brought before the Society was always worthy of the most serious consideration, even though it ran counter to what might be regarded as orthodox.

Mr. Spiller asked one question. What was the earliest recorded case he knew of in history of postnormal occlusion?

The following contribution from *Mr. H. T. A. McKeag*, of Belfast, was read:

There is so much of the attitude of philosophic doubt about Mr. Bennett's paper that one requires to be careful in deciding what conclusions he would have to draw. It seems, however, safe to say that his main theses are: first, that we may cease to regard "normal occlusion" as an unalterable ideal; and second, that an evolutionary change is at work in man which tends to bring the mandibular arch further back in relation to the maxillary. With the first of these my only quarrel is that it is only necessary to make the hypothesis because the term "normal occlusion" is used instead of "ideal occlusion." Were it stated

like this: That there are departures from ideal occlusion which do not call for treatment I should be in complete agreement, but I cannot see that a standard based on a quite arbitrary conception of ideal form can be established as "normal" for a functional structure such as the dentition. That subject, however, is too big for full discussion now. With the second thesis I find it impossible to agree. It seems to me that the evidence for this evolutionary change in the dentition towards a backward relationship of the mandibular arch, or of the mandible, is too slight. In the first place one may examine the statement that prehistoric man had normally an edge-to-edge bite. In a very narrow sense it is probably true, but I will make bold to say that it is even more probable that up to the age of, say, 20 an edge to edge bite of the permanent incisors was as much an abnormality then, and as much a departure from the average, as it is now. The edge-to-edge bite was established at a later age by a process of wear of the molar and premolar cusps and of the incisal edges, just as in our day it is established in the later stages of the deciduous dentition in many children, and even in the permanent dentition where the teeth are preserved long enough for the less intense wear to take effect. Even in this later stage, which of course I regard as equally normal with the earlier overlapping stage, there seems to be room for doubt as to whether the bite was actually edge to edge in a strict sense. It is not unlikely to have been as it becomes now, something like this rough sketch. I believe similar conditions of life would produce a similar adult average today. The only other evidence in support of this second hypothesis is in connection with a tendency to a relative diminution of the size of the maxillary canines. I am not familiar with the material on which this is based, but the chain of reasoning from it contains, as I think Mr. Bennett will agree, some slender links, but there is one point where it seems to me that links are missing, and their place is taken by some very bold assumptions. I will quote verbatim: "If we are asked to say what is the most usual kind of slight abnormality to be found associated with normal occlusion and tolerably well-developed dental arches, I think most of us would say some degree of imbrication—of the lower incisors. If this is true it indicates that the upper arch is gradually becoming too small for the lower, and nature can best make the necessary correction by placing the mandible further back." First, is it necessarily true that this imbrication indicates that the maxillary arch is becoming too small for the mandibular? I do not agree any more than I would agree that the case of regular mandibular and spaced maxillary incisors, which I regard as normal in a large proportion of mouths, indicates the same conclusion. The even bolder assumption is then made that nature, in placing the mandible further back, is adopting an alternative and better method of making the necessary correction for the same defect. Even if one cuts out the word "best" I cannot think of a shred of evidence to support the assumption that we have here two kinds of adaptation to meet the same change. The conditions which produce postnormal occlusion (to use the common term) seem to me totally different from those which produce imbrication of the mandibular incisors. How then, denying the evolutionary theory, do I propose to account for such cases as Mr. Bennett has shown? I would say that they are two out of the enormous number of forms which the human dentition can take under the influence of the many and varied factors, hereditary, mechanical, nutritive, which go to the formation of every dentition. There is a difference only of degree between these and many cases which we are treating every day. To put a finger on one factor which from my experience is likely to have aided in preventing the second case illustrated (G.G.B.) from developing a gross proclination of the maxillary incisors, I would hazard the opinion that the lips are fully normal, in of course the functional sense. I have seen conditions closely resembling those in both sets of models produced from Angle's Class II, proclination cases, as the result of orthodontic treatment which had failed to cure the close bite, but in which attention had been given to lip function. Obviously, in so frankly challenging Mr. Bennett's views I should produce evidence, but I regret that time does not permit the collection of such material as I have. Mr. Friel read a paper in the U.S.A. last year which contains, I believe, relevant evidence on the subject of the evolution of the individual dentition, and which should shortly be published. Need I say that I have been most intensely interested by Mr. Bennett's paper, and that I recognize the probability that it is merely because he has not presented an exhaustive study that I have found grounds for disagreement.

Mr. Lindsay said Mr. McKeag had anticipated a criticism which he was going to make of Mr. Norman Bennett's paper, particularly, of course, in the latter part of it, and he would enforce that criticism by recalling that some time ago Mr. Humphrey, of Birmingham, gave a paper before the Society in which he described and submitted for inspection certain skulls from a Saxon burial ground at Bradford-on-Avon, and while in some of the older skulls the teeth, both maxillary and mandibular, were greatly rubbed down, and the bite was undoubtedly edge to edge, there were the very interesting cases of two skulls of comparatively youthful age in which the bite was not edge to edge, and there had not been that attrition which produced the forward movement of the mandible. He thought that probably supported Mr. McKeag's criticism of Mr. Bennett's assertion, although, of course, he did not forget in that matter that Mr. Bennett's statements had been reinforced by the researches of Sir Arthur Keith. There was another interesting point mentioned by Mr. McKeag, and that was the comparative size of the canine teeth. It was known that there had been a reduction in the size of the canine teeth during the course of successive ages. Charles Darwin had called attention to that, but he thought there had also been a reduction in the size of the incisors and of all the other teeth, and he would like to express wonder as to whether there was really associated with the diminishing size of the canine teeth, that high degree of intelligence which Mr. Bennett noticed. He could not help wondering, when he had read that, what was the size of the canine teeth in Darwin, or Gladstone, or Disraeli. He rather thought that it would probably be found that in highly intelligent people of the present day the canine was a comparatively large tooth, and lastly he would ask Mr. Bennett if he seriously suggested that there was a lessening of the size of the maxilla not accompanied by a corresponding diminution in the size of the mandible, because if the diminution in size of the maxilla was of what was called a phylogenetic character, it would surely be accompanied by a corresponding diminution in the size of the mandible. He thought it would be very difficult indeed for anyone to say whether those cases with which Mr. Bennett had been dealing were pathologic or evolutionary. Probably there would be an element of both. He had been rather astonished that Mr. Pitts, in his remarks, used the words: "If there is an evolutionary change taking place." Shade of Charles Darwin, was it to be supposed that the evolutionary process had stopped for a time? He thought there was no doubt that there was an evolutionary change, but whether it was towards producing in the European or in the ordinary human species a postnormal occlusion was a very different thing. With regard to the size of the canine teeth, there was a Frenchman who investigated this question in connection with pigs. If the common domestic pig did not lose its tusks entirely they diminished very much in size, but when the pigs were turned into the woods and permitted to feed in a natural manner their tusks grew longer. Perhaps the same results might occur in man. If the human species were fed in a proper manner they might maintain the intelligence at the same time as they increased the size of the canine teeth. He thought there would be general satisfaction that there was at least a tendency to listen with a certain amount of patience to any one who came forward in an orthodontic society and suggested that it was not always necessary to introduce treatment in orthodontic cases; and for that the Society certainly owed Mr. Norman Bennett its thanks.

Mr. Norman Bennett (in reply) said his main object in giving the communication was to be stimulative, and, therefore, if he might accept what Mr. Badeock had said as the truth, he thought he had at any rate succeeded to that extent. It was extraordinarily difficult to reply to all the remarks that had been made, but he would do his best. He would start first of all in order with Mr. McKeag's written remarks. Mr. McKeag had to some extent, he thought, misunderstood his meaning. The communication was not a paper; there were not any assumptions in it at all; there was very little in the way of argument; he did not think there were any links in the chain, and if there were they were certainly weak ones. It was not an argument: it was a fantasy. It was only meant to consist of a few suggestions and ideas based on a certain amount of evidence, which might lead other people to bring forward further evidence in support, or destructive evidence in opposition, and to that extent he hoped that it had been successful. The President had asked about

mouth-breathing. The first boy, he thought, had never had enlarged tonsils or adenoids, and had never been a mouth-breather. The second boy had tonsils and adenoids removed at about four years of age, and was a mouth-breather at the time, and had remained a partial mouth-breather since; but although he was a partial mouth-breather he had well-formed lips, which he thought held the teeth in position. He did not agree that both those cases were Class II, Division 2. The first, he thought, was—if one used Angle's classification, but he did not think the second one was, because Division 2, if it meant anything, implied retroclination of at any rate the central incisors, if not all four. There was certainly no retroclination; there was no proclination; those incisors were in a more or less normal position. It was Class II, but he did not think it was any division at all. It was no use trying to put all cases into any kind of accepted classification. The classification had got to be made to fit the teeth, not the teeth made to fit the classification. As regards the question of overbite, the President had said that possibly some expansion might have corrected the overbite, and thereby benefited the cases. He might say in parenthesis, while he thought of it, that he was a little surprised really that more members had not said that he ought to have treated those cases. He was not at all sure himself that he ought not to have treated them. He had always refrained from doing so, and had hovered on the brink every time, and that had been the result; but he was not at all sure that he was right. With regard to the overbite, Mr. Bennett asked the President whether, when he said "expansion," he meant lateral expansion or expansion generally, pushing the front teeth forward.

The President: Lateral expansion.

Mr. Norman Bennett, continuing, said perhaps he had not quite understood the point, but he was not quite clear how lateral expansion could correct the overbite—he thought he had just seen the President's point. Possibly he might have expanded, but he refrained from doing so because in neither case was the maxilla really narrow; it was perhaps a little narrower than normal, but it was not really narrow. The second point was, did overbite matter? That was what he wanted to ask people. Where one had a deep overbite and the mandibular incisors impinged on the gum, obviously that mattered. Where the overbite impinged on the cingula, or maxillary incisors, and pushed them outwards, that obviously mattered; but if it did not do either of those things what did it matter at all? It might be argued that it impeded mastication. He did not think it did, because, although mastication in a child largely consisted of anteroposterior movements, in the adult it largely consisted of lateral movements, and he did not think the overbite made any appreciable difference. With regard to the profile and chin, both the boys had chins and mandibles which were rather subnormal in size. They were boys with big heads and rather small mandibles, but this defect was not really noticeable in either case. If it had been he should have felt much more inclined to adopt treatment than he did in order to correct that appearance; but he had felt rather that he would be aiming at converting what was natural to these boys into something that did not properly belong to them. Then as regards the first boy, he could only correct the occlusion (by bringing the mandible forward) if he first converted what was now a retroclination of the incisors into a proclination, because otherwise he did not think there would have been room for the mandible to come forward at all. With regard to the question of evolutionary change, he did not think Mr. Pitts had quite "got him." He did not mean to imply that those two cases indicated an evolutionary change. What he meant was that there was the possibility that there was an evolutionary change towards a postnormal occlusion, and that cases like those that he had brought forward indicated or illustrated a half-way condition. He did not mean that those cases, because they happened to be cases of postnormal occlusion without any obvious ill-effects of another kind, were necessarily what nature was aiming at, if he might use a teleologic expression. He meant rather that, as Mr. Badecock had said, there appeared to be an increase in the number of postnormal occlusion cases, and that these two illustrated a rather unusual state of affairs, in which the postnormality was not accompanied by other ill-results. With regard to the difference between Class II, Division 1, and Class II, Division 2 cases, he would like to discuss that in the light of what Mr. Badecock, Mr. Chapman and Mr. Cale-Matthews had

said. Mr. Cale-Matthews had reminded him of what he was sure was true, namely that the mandibular development, or at any rate the chin development, was more satisfactory in so-called Class II, Division 2 cases than in Division 1 cases, and Mr. Badcock and Mr. Chapman disagreed with him when he said that the extraction of maxillary premolars was usually disastrous. He thought that depended upon what was regarded as disastrous. The usual state of the maxillary incisors in the Division 2 cases was, he thought, that the central incisors were very much retroclined, and the lateral incisors either slightly proclined or possibly in their normal position. The central usually sloped backwards, and the lateral usually sloped forwards, and the canine was usually more or less vertical. Now if one extracted a premolar, as Mr. Chapman said, and if one extracted it early, the canine very easily dropped back into the position of the premolar, and the lateral either would follow or could be made to follow and to fall into alignment with the central. That was what he regarded as disastrous, because he thought that there were few conditions so ugly as an extreme degree of retroclination of the maxillary incisors. He agreed that it was more ugly to have the centrals retroclined and the laterals proclined; that was worse still; but he thought that if they were all retroclined and looked as if they were falling down the patient's throat that looked ugly too. That brought him to a question he had raised in his little paper. He thought, and Mr. Cale-Matthews seemed to agree with him, that there was some fundamental difference between Class II, Division 1, and Class II, Division 2. One had to be dogmatic in teaching, and he had been accustomed to teach that the difference between the two was a question of the lips. If the upper lip was short, and the lower got in between the maxillary and mandibular teeth, then the maxillary incisors came forward and one got proclination; and if, on the other hand, the upper lip was long and the lower lip did not get in between, then, as it were, the strength of the upper lip carried the central incisors backwards, and one got retroclination. That was nice, simple teaching. He thought it was largely wrong. He did not believe that that was the whole thing at all, because going back for a moment to the question of extraction, one knew perfectly well that in a Division 1 case if one extracted the first premolars one got not merely a satisfactory result, but in many cases a very good result indeed—a better result, he thought, than one ever got in Division 2 cases by extraction. The incisors and canines were put into alignment, and into a tolerably vertical position, whereas in a Division 2 case he did not think one ever got that result by extraction—not even a tolerable result. If that was correct, what did it mean? He thought it meant that in Division 2 cases the whole of the maxilla was set further forward than it was in the case of Division 1. The whole of the maxillary arch, the whole of the dental arch, was set further forward, and that was why one was faced with two difficult alternatives—the one of producing an unpleasant degree of retroclination by extraction or, on the other hand, of converting it into a proclination in order to get the mandible into position. With regard to Mr. Lindsay's remarks, he did not doubt that there were many highly intelligent people with large canines. Intelligence did not go with any particular form of teeth; it might go with large canines or it might go with small ones. Nevertheless, he did think that he had observed that those children with small maxillary canines which erupted early were usually an intelligent type of child. That might be right; he did not know. Other people might find something different; but that had been his observation, and he ventured to say that it was confirmed by evolutionary ideas. Mr. Lindsay had given an example of pigs, but he would point out that while the boar had a canine which was partly used for purposes of digging up food and partly as a sexual weapon, the canine of the apes was a sexual weapon; and therefore it was not unreasonable to suppose that as evolution progressed—and he agreed that it was still progressing—as mankind rose to higher levels, his canines became of less and less importance, and became of smaller size and erupted later, just as the canine of the chimpanzee erupts later than that of the gorilla, which was in some respects of a lower type. The question of the edge-to-edge bite was very interesting. As Mr. Lindsay had said, he had based what he said largely on the authority of Sir Arthur Keith. At the same time it was an interesting question whether the edge-to-edge bite was not usually found in skulls of mature age, but he did not think that the Anglo-Saxon skulls that were brought forward as an example would go very far to upset the theory, because the Anglo-Saxons were people merely of yesterday. The

date, if he was correct in his history, was about 800 A.D. That was only 1,100 years, and reckoning three generations to a century that was about thirty-three generations. There was little difference to be observed after thirty-three generations of rats or rabbits. Thirty-three generations were nothing. When he talked about edge-to-edge bite he was talking about something very much farther back than that—sufficiently remote to allow time for evolutionary changes to take place. If those changes had taken place since Anglo-Saxon times he would say it was extremely remarkable; but it was sufficiently remarkable if it had taken place since, say, the Bronze Age or the Stone Age. He thought he had dealt with all the points except that raised by Mr. Spiller, who had asked a question which was most interesting: What was the earliest period in which cases of postnormal occlusion were found? He did not know. He wished Mr. Spiller could tell him. He presumed that in any skulls since Anglo-Saxon times—any mediæval skulls—there would be found plenty. Beyond that he did not know; he wished he did. It would be a most interesting point to investigate. He was very grateful to the members for having taken so much interest in such a very short and fragile communication. The point he especially wanted to bring out was that it was a mistake to get too much tied up by hypothetical notions and particular ideals, and to think that all cases that did not conform to canonical regularity required elaborate treatment.

A hearty vote of thanks was accorded to Mr. Norman Bennett for his paper.

PREPARATORY MEASURES FOR REGULATING CASES*

BY DR. HANS HECHT, BERLIN

WHEN a child is brought to us for treatment of maloclusion, we must first of all find out the kind of maloclusion which the case presents. Then we must examine the patient from the constitutional point of view. The next consideration is, can the treatment be commenced at once or not? In general my method of procedure is to correct a maloclusion as early as possible. If, however, a child is of a very delicate constitution, suffering severely from rickets for instance, being under normal weight, undersized, or very weak, I rather advise the parents to let the child first have plenty of fresh air and sunshine, good nourishment rich in phosphates and vitamins and plenty of exercise in the open air before we commence treatment. The tissues thus gain vital power, so that the stimulus of growth and development which regulating appliances excite, will be more readily responded to. The same will be the case with a delicate child showing signs of inherited syphilitic infection. A Wassermann test should be made, and if the reaction is positive, the child must first undergo an appropriate treatment. The same precautions in regard to the health of the child have to be taken in cases of tuberculous and badly nourished children. Children whose health, in spite of favorable constitutional conditions, is easily affected, should be treated at intervals by carrying out only a certain part of the regulation and retaining it. We sometimes may leave the chance of regulating the remaining malocclusions to nature, if the start of the regulation was begun in the right way. We need then only retain the correction for a short time and relieve the child of all apparatus. If a child is careless and mischievous, and shows no interest in the regulating of his teeth and does not keep his teeth or the apparatus clean, we must try to rouse his interest in the regulating process. At the same time we had better divide our treatment into short operations, retaining the already regulated teeth by apparatus which at the same time protects them from caries. Very thin platinum gold bands 0.07 mm. thick, going underneath the gum line and strengthened by a thin platinum gold wire soldered to their buccal or lingual sides, will be sufficient. If a child does not reside in the same city as the practitioner and can therefore only be treated once a month, and the case is such as demands very close attention on our part on account of many individual tooth movements by ligatures, it is better to decline to treat the case on account of the impossibility of keeping the mouth clean. Naturally we must endeavor to use only such appliances as may be easily cleansed. Crozat's cribbing device as shown by Dr. Henry last year, is one of the appliances that may be successfully used in these cases, as the patient can take it off, clean it outside of the mouth, wash his mouth and

*Read before the Congress of the European Orthodontological Society.

reinsert the apparatus. The apparatus is of such strong construction that the patient, in handling it, cannot easily break it. Of course, the child must be an intelligent one and very much interested in the regulation of his teeth, understanding why the necessity of keeping the mouth clean is of so great importance.

Nasal obstructions, which produce difficult nasal breathing and in consequence compression of the arch and malocclusion of the teeth, must be looked for when cases of Class II, Division I and subdivision present themselves. Such patients must first be sent to a specialist to have these obstructions removed and the nasal passages opened. Another surgical operation has to be performed when an abnormally attached frenum labii of very strong muscular filaments runs in between the central incisors into the palatal mucous membrane, thus separating the two incisors. Children having bad habits such as tongue or lip biting, sucking of the cheeks, etc., producing malocclusions, must be cured of these. In order to understand the intrinsic causes of malocclusion, we must investigate not only the child's health and constitution, but also those of his family. This, of course, is very difficult to find out from patients in private practice, but a tactful questioning may lead to desirable results, as to whether rickets, tuberculosis, syphilis, lunacy, etc., have been in the family. The mother's state of health during pregnancy is of importance too. The laws of inheritance may explain some cases of malocclusion and therefore impressions of the mouth of both parents and brother and sister may be of interest. The tests of Abderhalden for the sufficiency of the different endocrine glands should be made, where other symptoms will not satisfactorily explain the malformation and reduced size of the jaw and teeth, and treatment instituted accordingly.

In examining the mouth, we must observe whether the normal number of teeth are present, as otherwise normal occlusion is impossible. Quite often the canines are impacted or the lateral incisors or the second premolars missing. An x-ray picture must be taken before treatment is commenced. In case of the impacted canine, surgical operation has to take place, freeing the impacted tooth from its cortical bone layer to such an extent that our regulating appliance can take a good hold of it. In cases where teeth have already been extracted or in cases of missing teeth, the question presents itself whether we should substitute the lost teeth by artificial ones, or whether we should extract the corresponding teeth in order to keep up an anatomic articulation. Age, sex, appearance and local conditions have to be considered in deciding the treatment. The findings of the x-ray picture are of greatest value for the construction of the regulating appliance and manner of procedure and should always be taken before the beginning of the regulation. X-ray pictures should also be taken and referred to during the regulation as well as after the case has been finished and retained for some time. It is very interesting to observe the transformation of the formerly calcified bone into osteoid tissue at the places where our appliance is at active work. The reformation of osteoid tissue to bone at the end of the retention period is the best evidence that our work has successfully ended. A first molar, for instance, which is dead and had been repeatedly treated for inflammation of

the root and finally filled, is usually unfit for the attachment of anchor bands, as the surrounding bone is so easily irritated that inflammation sets in when the anchor teeth are put under stress. We must then choose the second molars for anchorage. The x-ray picture shows us this pathologic condition of the roots, also their shape, their directions if tipped or straight, and their possible interference with the movements of the teeth in regulation.

Correction of dental defects which deform the inclined planes of the masticating surfaces and disturb the normal relation to those of the opposing teeth, must be done before treatment is started. If we see a child with many cavities on the gum line we must instruct the parents not to give sweets to the child, especially not in bed before going to sleep, but to insist on cleaning the child's teeth by brushing, washing and syringing his mouth with a lime water solution to prevent latent lactic acid from dissolving the lime salts of the teeth.

What type of appliance should be employed depends on the extent of the malocclusion. In order to determine this extent exactly, we first examine if the shape of either arch is symmetrical. Then whether harmony of form exists with regard to the fitting into each other of maxillary and mandibular arch; if the profile line of the face reveals any protrusion or retrusion of one of the jaws. We must observe if teeth are in supraocclusion or infraocclusion. Furthermore, we adapt the symmetroscope of Grünberg to the models and find out if the middle line passes between the two central incisors or not; which teeth on each side of the arch have gone forward, and which of the front teeth have gone backward, forward or sideways, which teeth are in their right position, which are buccally or lingually displaced, which are in torsooclusion. Thus, we learn which teeth are in their normal position and may be used for anchorage, which teeth have to be regulated, what movements have to be done, and which movements can easily be produced by reciprocal force. We then study if impediments to these necessary movements of the teeth to be regulated exist, either in the same jaw or in the opposing one. The task of regulating must only be concentrated on those teeth which are out of place, but quite often space has to be provided for the movement of these teeth, and teeth in normal position adjoining them must temporarily be moved. But we must not forget to move these teeth back into their normal positions. The regulating appliance is worked with regard to all these items. Speaking in general of constructing an appliance which should do the work accurately, I believe that certain kinds of apparatus used for regulating teeth do not answer the purpose even when used by the most skillful practitioner. They all work with the force given by the elasticity of the wire, and the counter effects of this force at the other end of the wire are not easily seen at the beginning and may lead to collateral effects not intended. Therefore to exclude as much as possible these undesirable effects we must look for the application of reciprocal force wherever possible, and for accessory anchorage and stabilization in the construction of our apparatus. A great number of different types of regulating appliances being at our disposal, we are able to choose the one most suitable for the case. I may say, where many individual tooth movements have to be done and the patient is

at our disposal, the old expansion arch of Angle is the best adapted and the most easily applied. It must, however, be followed by the use of the ribbon arch and bracket apparatus of Angle, when bodily movement has not been accomplished. I have not spoken of the Kephalo-metric system, as I do not believe it to be a system for directing orthodontic treatment. It is, of course, very interesting for us from the anthropologic point of view. The aim to use these measurements to introduce a norm for the ideal form of the arch is, as no two faces are alike, an impossibility. We have one point from which to start our work, and that is to bring those articulating surfaces together which nature has made for each other, and do this under the observation of symmetry of each single arch as well as of both in occlusion. We have then perfect occlusion. Perfect occlusion will produce perfect function, and perfect function will develop perfect functional form, and that is our goal. Angle's diagnostic system and classification has proved all that it claims in the hands of the conscientious and skillful orthodontist, and it is as near ideal as mankind is able to understand the wonderful work of nature.

DISCUSSION

The President said it was always valuable to know what the best men in the profession had found useful in their treatment of cases, and in that connection the members' thanks were due to Dr. Hecht for his paper.

Dr. Hipwell (Paris) said one thing Dr. Hecht had brought out was that practitioners should not be too anxious to take cases which were living in some other city, and with which they could not be in close connection or keep under continuous scrutiny.

Mr. Barrows (London) said Dr. Hecht had brought out everything it was possible to bring out in connection with the subject matter of his paper. He was not quite clear why, in the case where two teeth had been extracted on the side, Dr. Hecht had applied artificial substitutes. He thought it was a pity to put in an artificial substitute in the premolar or molar region. Personally he would suggest closing the spaces in such cases.

ANGLE OR SIMON*

BY DR. E. LEVY-DAVIDSOHN, HAMBURG, GERMANY

IT IS not my intention today to speak much about the systems either of Angle or Simon, as enough has been said about those already, and further I suppose both systems are well known to all of you. I only want to show you a few examples, models of one or two cases, which may speak for themselves, thereby showing you the difference between the two systems. But before going into details I want to discuss a few points which are important for our mutual understanding. Angle, it is known, marks the first maxillary molars as keys of occlusion, and bases on their position—which according to him is always right—and on their reciprocal relation, the classification and diagnosis of malocclusions. Therefore he divides the anomalies into three classes:

Class I.—Normal mesiodistal relations.

Class II.—The mandible is too far distal as compared with the maxilla.

Class III.—The mandible is too far mesial as compared with the maxilla.

The different divisions and subdivisions I do not want to mention here because they are of no importance to our subject.

Angle asserts that the maxilla, as the part fastened to the skull, could never be influenced by anomalies of the denture, at least in sagittal relation; and further, that the first molar had always a permanent and right place in the maxilla. Therefore, when Angle speaks about the treatment of cases of Class II, he says: "It is a generally spread error to consider this form of malocclusion as a consequence of overdevelopment of the upper jaw. The author has never observed such a case." It is very convenient to terminate all objections by opposing great experience to them, but we cannot take this as a proof, especially if these conclusions have not been won from objective investigations. If there is a displacement of the maxilla, it can only be found by systematic measurements of its position in relation to the skull by cephalometric methods, but Angle has never tried it. On the contrary, he tries to prove the constant position of the upper first permanent molars by very extensive reflections, which are all only felt and not scientifically proved. For example, he says that their germs are formed as the first of the permanent teeth, that they first develop and erupt, and further that the temporary denture standing before them is usually normal, which guarantees a safe guide to the first permanent molars during their eruption into the right position. This hypothesis of Angle's of the constant position of the first upper molars has since been doubted frequently, and at the International Congress in Berlin, 1909, it was discussed and stated "that this hypothesis must be considered as transitory and that it is not tenable to consider either the upper or

*Read at the Congress of the European Orthodontological Society, 1927.

the lower first molars as fixed points standing always in the right place, because it does not correspond to the real conditions of the teeth, nor especially to the real conditions of the jaws."

But also Angle's thesis of the usually normal temporary denture is false. I have proved it in a little paper about the anomalies of the temporary denture (*Journal of Dental Orthopaedia*, No. 11, 1922), in which I have shown that the temporary denture shows just the same anomalies as the permanent one. The mistake of Angle's system is that he comprehends orthodontia plainly as the science of the anomalies of the teeth, which definition is much too narrow. A superficial view of some individuals with malocclusion already shows that the so-called anomalies of the teeth are in reality anomalies of other parts of the denture, which means the processus alveolaris and the body of the jaws and, looking at the face attentively, you will observe that there is also a displacement of the denture or its parts in the head. The task which we have to perform may be expressed in the following way: It is the question of discovering for each of the elements of which the denture consists the exact position in the skull or head, so that everybody knowing the result of the measurement—that means the measures found out—is able to perform an exact reconstruction.

To determine a body exactly we must make the measurement by three dimensions, and must apply the same principle in order to state the position of the denture, which is a body enclosed in the capacity of the head.

As the denture is no isolated body, but enclosed in the head, these three planes must be planes of the head, a horizontal, a sagittal and a frontal plane. The horizontal plane is the so-called Frankfort horizontal plane, which has been used for some time in anthropology and which passed through the eye-points (corbitalia) and the ear-points (tragia). It is the physiologic horizontal plane, which means that if somebody holds his head erect in equilibrium this plane is absolutely parallel to the ground.

The sagittal plane is the raphe-median plane which passes through two occipital points of the raphe-palati, and is standing perpendicular to the ear-eye plane.

The third frontal plane is the orbital plane, which has been introduced into orthodontia by Simon. It intersects the eye-points and stands perpendicular both to the ear-eye plane and the raphe-median plane. You will see later on, that it is this plane which is most important to us. I want to mention that Van Loon, teacher at the University of Utrecht, has suggested these investigations by a paper entitled, "New Method to State Normal and Abnormal Relations of the Teeth to the Face," published in the *Journal of Dental Orthopaedia and Prosthodontia*, 1916, Nos. 1-4. Van Loon only wanted to solve the theoretical part of this question and to show that Angle's hypothesis is not tenable. The proceeding which he has invented cannot be used in practice. Simon first took up these ideas, and completed them, and erected a system which is of enormous importance to orthodontic diagnosis and therapy.

I cannot fully explain to you here the way to take the impression, the so-called gnathostatic, as it would take too much time and is not suitable for this short paper. I only want to tell you that the gnathostat model, finished, shows the three planes mentioned above. The basis of the upper model is identical with the ear-eye plane of the patient in question, and further the raphe-median plane and the orbital plane are drawn around each model. The basis of the lower model is parallel to the upper base, which means also to the ear-eye plane. After the same principle a photo of the patient, the so-called photostat photo, is made, which also shows the three planes.

From these three planes Simon deduces the variations from the normal. As to the conception of "normal," which word is very often used by all of us without having a correct idea of its meaning, I want to draw your attention to Simon's little book, "The Concept of Norm in Orthodontia," which gives a full explanation of this subject.

The measurements are now made:

(a) From the raphe-median plane.

Then we have to distinguish:

1. *Contraction*.—The part of the jaw is too near to the median plane.

2. *Distraction*.—It is farther away than is normal.

(b) Measurements from the orbital plane:

3. *Protraction*.—That part of the jaw is standing more forward than is normal.

4. *Retraction*.—It is further back than is normal.

(c) Measurements from the ear-eye plane:

5. *Attraction*.—The part of the jaw is too near to the ear-eye plane; that is to say, it is standing higher in the head than is normal.

6. *Abstraction*.—It is too distant from the ear-eye plane; that is to say, it stands deeper in the head than is normal.

By investigations on his great material, which are still continuing, Simon has found out two laws. Firstly, the so-called orbital-canine law, which declares that, in the normal denture, the orbital line intersects the cusps of the canines, and secondly, the orbital-gnathion law, which declares that in the normal denture the gnathion lies on the orbital line. These two laws give very important information, especially with regard to the sagittal anomalies.

After this digression I want to show you the models of three cases where, first, an impression has been taken after Angle's method, and afterward a gnathostat impression after Simon's. I beg you to look at Angle's models first. You must acknowledge that the three cases give the same view. After having thoroughly examined the occlusion, we must therefore, as it is the question of a distal bite, make the diagnosis: Angle Class II. Consequently, in all three cases the treatment consists in drawing the mandible forward.

Now would you kindly view the gnathostat models. Today I want to draw your attention especially to the sagittal deviations which have been

found out by the measurements from the orbital plane, as we can best see here the difference from the other method. You see that in Cases I and II the orbital line passes through the cusps of the canines, in Case III through the cusps of the premolars. In Cases I and II, therefore, the maxillary lateral teeth are absolutely normal, and we have to do only with a frontal protrusion of the crowns of the teeth, while in Case III, where the orbital line passes through the cusps of the premolars, there is a total upper protraction. Here the orbital line in the mandible is normal. For, corresponding to the upper jaw, the orbital line in the normal denture passes in the mandible through the distal edges of the canines. Here, where we have a real surplus of bone, the treatment must be to move all the lateral teeth in the maxilla distally, and afterward, of course, to press in the front. But this treatment is only possible until about the twelfth year, so long as the second permanent molars have not yet erupted. Afterward this movement is scarcely possible, and very difficult to perform. After the eruption of the second molars it is advisable to extract the first premolars on each side.

In Cases I and II, though both are a lower retraction, they show great differences. Would you kindly examine for this purpose the photostat photos? If you follow how the orbital line passes through in both cases, you will observe that in Case I the chin-point (gnathion) is lying far behind the orbital line. In the second part we have, therefore, a normal chin and the retraction concerns only the alveolar part. In the first case, however, the mandible is retracted in its totality. The treatment, therefore, must be an entirely different one in these two cases. In the second case with the normal chin, the single teeth must be bodily removed forward one after the other, while in the first case the bone of the mandible must also be influenced in the proper way. To go into further details as to treatment would lead us too far. All who are interested in these questions may read it in the fundamental book of Simon, "Fundamental Principles of a Systematic Diagnosis of Dental Anomalies of the Teeth and Jaws," which has now been translated into English by Dr. Van Loon. I only hope that these new examples will have given you an idea of the difference of the two methods, and will have shown you what enormous progress for orthodontia Simon's method has brought us. In conclusion I want to speak of one objection which has very often been raised against this system. It has been said that gnathostatics is much too difficult, that it only adds much unnecessary work to the other one, and that it is only important for the investigator and not for the practitioner. Of course, everything must be learnt at first, and difficulty is never a rational objection against a system, but I assure you that, after having studied the subject for some time, you will not find any great difficulties in it. The little extra work you will have to do will be richly compensated for by the enormous relief you get by it for your treatment, because by this carefully prepared diagnosis everything you have to do lies clearly before you from the first, and this also gives us much pleasure in our work, a thing which is so very important to preserve.

DISCUSSION

The President thought it would probably be better to take the discussion after hearing Dr. Paul Simon on the subject of gnathostatic diagnosis.

Dr. Paul W. Simon, in the course of his remarks on this subject, said: It is not my intention to give a full explanation of the theory of the gnathostatic system: the time is too short and the subject too complicated and difficult for that. So, therefore, I beg you to read my book entitled "Principles of Systematic Diagnosis of Dental Anomalies," with its small appendix, "The Norm Concept in Orthodontics." The book is translated by Dr. Lischer, of St. Louis. Today I prefer to demonstrate to you the technical procedure of the gnathostatic method, because I am of opinion that you will understand the theory by studying the book, though not perhaps so well the technic of the method. We need for the gnathostatic diagnosis two reproductions of the patient, one of the teeth and the other of the face, what we call gnathostatic and photostatic. Both these have a common relationship to the three planes of the head, the ear and eye plane, the horizontal plane going through the two orbital lines, and the two ear-points. Secondly, the median plane, the plane of symmetry going through the two occipital points of the palate perpendicular to the ear-eye plane; the third plane is the orbital plane, the frontal one going from the two orbital points perpendicular to the two other planes. I have here a gnathostatic model in which the three planes are represented by colored cardboard. The red one is the ear-eye plane or the Frankfort horizontal plane, the black is the median plane, and the green one the orbital plane, going in this case through the cusps of the maxillary canines. The gnathostatic model has two bases which are parallel to each other, and each gnathostatic model has always the same height, namely, 8 cm. Further, the upper base of this model is always identical with the ear-eye plane of the patient. I am now going to demonstrate to you the method of making such a gnathostatic model.

Dr. Simon also demonstrated the method of the development of the photostat.

The President said he was sure all the members had watched Dr. Simon's demonstration of his gnathostatic diagnostic methods with great interest, and he thought everybody must have followed the details of the method quite well. The one question he should like to ask was, whether Dr. Simon had any gnathostatic models or photostatic photographs of completed cases so that it might be possible to see the difference in the photostatic photographs before the work began and after the completion of the treatment.

Dr. Barrows complimented Dr. Simon on his demonstration. He had read Dr. Simon's book, but it was much easier to understand the demonstration that had been given that afternoon. One question which was not clear to him was the orbital line. The mark was taken from the pupils of the eyes, and he should like to know what happened when the patient was cross-eyed!

Dr. Quintero wished to congratulate both Dr. Levy-Davidsohn and Dr. Simon on the work they had done. He himself used gnathostatic models very frequently in his practice, and had not much criticism to offer, but his method of procedure was slightly different in some points, and he should like to ask Dr. Simon a question which had a certain importance. Dr. Simon's pupil, Dr. B., examined a certain number of sketches and found that the palatal suture was in the median plane or about in the center, in a great percentage of cases. Dr. Simon started from the palatal suture and further determined his orbital plane by positions at 90 degrees. If in twenty cases in one hundred the median suture was not median, then the orbital plane became abnormal on the models, and he should like to know how Dr. Simon proceeded so as to get a correct orbital plane.

Dr. Hughes wished to know how long it would take Dr. Simon in half a dozen cases to make a diagnosis, particularly in a hospital. A clinical teacher had to give six cases within an hour or an hour and a half to a number of students, and it would be interesting to know how Dr. Simon's method compared with Mr. Campion's measurements, which consisted of

certain vertical measurements and certain anteroposterior measurements which could be taken in ten minutes and compared with norms or the mean of a certain number of norms at definite ages; he thought the ages were nine to sixteen and adult cases. By that means the faults in many of the cases could be localized in twenty minutes quite easily, and he was wondering whether that could be done in Dr. Simon's cases. He congratulated Dr. Simon on his method of taking the photographs; it was something he had never seen before. He had read Dr. Simon's book, but had not carefully studied the excellent method of taking profile and full-face photographs of identical size with a definite relation to the actual natural size.

Dr. S. Dreyfus said he used the Simon method and would show on the following day another gnathostatic method with which he thought it was easier to take the impression with a pair of points. He took the impression as Dr. Simon did, and he brought the gnathostatic arch on the impression, but, instead of having to do a lot of things, he used different points and obtained the information directly without having so much paraphernalia. The base of the models was also in one plane. Last year in Paris, at the meeting of the Society, he had given another meaning for the sagittal plane, and the account would be found in the *Transactions* of the Society. The method of Mr. Campion was improved by being used with the gnathostatic method, but the Campion method without the gnathostatic method had not really the three points which were necessary.

Dr. Herbst asked what was to be done if the canine was in malposition—for instance, out of line; and also what was the difference in young and adult people. He thought there must be a big difference because the teeth were growing to the front, and the orbital line must go through another point. Dr. Simon had said the orbital line must go through the canine, but if it did not go through the canine, did he move the whole maxillary bone backward or forward, or did he use extraction? Dr. Simon had said that very often he extracted the two premolars if the orbital line did not go through the canines, but the taking out of two teeth was a thing of very great importance and he himself should not like to do it preferring to leave the teeth in the position and probably to make broader the maxilla. It did not seem to him good enough to take away two teeth. In one of the last numbers of the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY* there were forty-eight pictures of cases treated by Dr. Simon's method, and of those pictures, all with normal occlusion, only 22 per cent showed the line through the middle point of the canine. He should like to know whether in the United States there was another situation of a set of teeth, or did it mean that the line did not always go through the middle point?

Dr. Hipwell said he disagreed with Dr. Levy-Davidsohn with regard to extracting teeth. He thought that if she gave six months' longer work to a case she would obtain a much better result and get more to the ideal without extraction.

Dr. Levy-Davidsohn said she regretted very much that she had not brought any finished cases with her. Her experience had not been as long as that of Dr. Simon, but she had a very large number of finished cases, and the photostatic photos were enormously instructive, even the failures being instructive, because they always showed what had been done. By the photostatic method it was possible to avoid many mistakes. The next time she had the pleasure of attending a meeting of the Society, she would bring with her a series of finished cases with photographs both before and after treatment. With regard to the time of treatment she could only repeat what she had said in the paper, that everything must be learned at first and that after studying it for some time, the taking of the gnathostatic impression did not occupy longer than about five minutes more than any other impression. A photostatic photograph did not take longer than five minutes. The preparation of the diagrams, casts, and other things occupied a certain time, but it was offset by the enormous relief in treatment, and therefore the little extra time did not much matter. With regard to the extraction of premolars, at first she tried to avoid extraction, but had come to the conclusion that she had better success in certain cases than she would have had if she had not made extractions. She had treated cases without extraction, but did not reckon them amongst her successes.

Dr. Simon said he possessed very many completed cases. He had used the method for ten or eleven years, and had treated many hundreds of cases, and had always taken gnathostatic models both before and after treatment, and was thus able to recognize whether he had met with any success or not. It enabled him to criticize what he had done, and that was the most important part of the method. He did not mean to say that the classification of Angle was unnecessary; Angle's classification was quite all right, but it was too narrow. It was possible to use Angle's classification II with a gnathostatic method and treat cases in that way, but by applying the method he had shown it was possible to see what had been done and whether what the orthodontist had wished to do had been carried out. The whole method was treated in his book, especially in the little Appendix he had mentioned. There was no question that the orbital line did not always go with correct occlusion through the cusps of the maxillary canines. The norm used in orthodontics, and which he used in his system, was an average one, but there were always cases which varied plus or minus. With regard to the time needed for preparing the material, in most cases the time was not longer than that for preparing the usual models. The preparation of the curve diagrams occupied a little longer, but that could be done by an assistant. The whole thing was a technical matter. Dr. Herbst had asked what was to be done in cases where the orbital plane was not going through the cusps of the canines. That was a matter of treatment, and he himself had been speaking about diagnosis. It was necessary to take a diagnosis, because one must recognize the difference between the norm and the abnormal. If the orbital line was not going through the cusps of the canines, but through the molars, then there was an anomaly, and it had to be cured by different expedients. Sometimes he extracted teeth, but very seldom. He extracted the maxillary first premolars, but only in those cases where the orbital line was going through the cusps of the premolars or from behind. There were other conditions for extraction; for instance, the age of the patient. If the patient was about twenty or thirty years of age, then he could not move the teeth backward, and it was necessary to extract. He was not of opinion that orthodontic work was purely mechanical. If in a child of about six or seven years of age, it was found that the orbital plane was going through the maxillary first premolars, the deciduous molars, then there was a total upper protraction, but if the case was treated with elastics it avoided the maxilla developing in the front direction. That gave the same success as extracting the premolars in adults. and was shown by gnathostatic and photostatic models. With those models important things in the development of the face and jaw could be studied.

A CRITICISM OF OPPENHEIM'S 1911 REPORT

BY HARVEY STALLARD, D.D.S., SAN DIEGO, CALIFORNIA

FOR nearly twenty years the conclusions of Oppenheim have gone unchallenged in America. Indeed, they have been regarded by certain textbook authors as the very cornerstones of modern orthodontia. His principal report, the only one available to orthodontists of the United States, entitled "Tissue Changes, Particularly of the Bone, Incident to Tooth Movements," published in 1911 in the *American Orthodontist*, Vol. iii, Nos. 2 and 3, did not properly describe the conditions under which he conducted his experiments. He published no radiograms of the teeth nor photographic records of arch casts made before and after the movements, of the animals showing their general conditions and of the appliances as they were applied to the teeth. The lack of this description compels the critic to assume so much that a good criticism of this work is impossible. However, this much can be shown that his work was of a clinical nature and that his conclusions were based largely on his general orthodontic experiences and were prejudiced by the teachings of the enthusiastic men with whom he associated himself in America.

Oppenheim performed his experimental orthodontics on the deciduous teeth of a few baboons (two, so far as his writings at my disposal show), studying the histologic changes occurring in bone when the teeth were moved labially, torsally, lingually, occlusally, and apically. Some of the teeth were subjected to the force for a little over a month (forty days), the animal was then killed and sections made of the alveolar process and the teeth. As reported in Grünberg's translations of Angle's "*Malocclusion of the Teeth*" (1913), Chapter xxiii, pages 710 and 715 inclusive, in another baboon he moved labially a maxillary and mandibular incisor for forty days and retained the maxillary in its new position for six months but allowed the mandibular incisor to relapse. In the case of both teeth, the histologic slides showed that the bone had been recalcified and that there was a line of demarcation between the original and the newer bone, with a slightly thinner but denser calcification in case of the mandibular tooth. In his first report, it seems, Oppenheim studied only the immediate reactions of the tissues obtained by the orthodontic forces comparing the sections with those made of corresponding teeth on the other side of the mouth which had not been moved and therefore were used as controls, yet a large part of Oppenheim's conclusions in that report dealt with orthodontic prognosis which, apparently, he believed depended on the building up of a good quality of bone.

His main endeavor was to perform orthodontics in the baboon under the same conditions as it is done in man, but the animal selected did not have malocclusion, therefore the reaction of its bone might be different from bone accompanying human malocclusion. Furthermore, he moved the teeth out of

occlusion, not from maloocclusion to occlusion. The tooth retained was held out of occlusion for six months. These two criticisms are of minor importance but show that his work differed fundamentally from orthodontic treatment so much so that conclusions drawn from it might not be applicable to human beings undergoing orthodontic treatment. In reporting his work on "Histological Alterations of Tissues During Retention" (Grünberg's second translation), he admits that a better understanding of the time necessary for retention can be had only through experience obtained under empirical conditions, such as the age of the patient, race, health, kind of maloocclusion, time spent in treatment, the appliances used and the kind of retainer employed. He himself realized that no analogous conclusions could be reached as to the length of time necessary for retention in human beings from these experiments because, as he suggested, baboons have a higher rate of metabolism and a shorter life.

The forces used in these experiments were derived from appliances—the expansion arch and ligatures—which in comparison to many modern arches and fixed attachments are crude, coarse, and inexact. Their use alone in such experiments would invalidate the trustworthiness of results so gained that conclusions as to gentleness and delicacy are void. Delicacy and gentleness are comparative terms and to modern operators these two terms seem unsuitable in describing forces derived from such clumsy appliances.

One conclusion he made was that tipping crowns into expansion did not move the apices oppositely and narrow the apical base. This seems to be justified by evidences in his slides and apparently would nullify the charge made by the advocates of bodily movement of teeth that tipping teeth into occlusion narrows the apical base. However, this conclusion which is contrary to mechanical facts should not be accepted as final because Oppenheim did not fully ascertain where he placed the fulcrum in his application of force. More experimental work should be applied to this problem which has been made an issue once more because, since Ketcham's work on root end resorption, several careful operators have returned to tooth-tipping appliances, that is simple expansion arches.

In his first conclusion, Oppenheim attributes "many failures" to a faulty bone formation or "retardation and injury to the final bone formation" obtained by needlessly repeating or reversing movements of the teeth, but he did not make any such movements of the teeth in the baboon and study the bone deposition after allowing it to rest. Therefore, this conclusion is not justified by his findings but is only a conjecture based upon his clinical experience. Of course, a skillful operator will plan his remedies so that he will obtain occlusion with as direct and as simple movements as possible, but such care may not spare him from having many relapses when the retainers are removed. This conclusion was drawn by Oppenheim shortly after the "Working Retainer" had been introduced, an enthusiastic moment in orthodontic history, when clinicians believed that good bone development and osseous tissues would retain teeth, if only they could obtain it by mechanical stimuli.

In his second conclusion Oppenheim claims that relapsing movements may result from a too rapid movement and that the retention period may be shortened, if the teeth are moved gently enough. It was upon this conjecture and the ideas associated with it that Mershon based his contentions for long gentle treatment (see page 684, INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY) for he said, "so the smallest amount of pressure we can apply and control, which will cause bone development and cause the tooth to change its position, would approximate the normal force of development as closely as it is humanly possible to estimate it." However, since Kingsley's time to the present, some good permanent results have been attained in treatment by rapid means. Obviously, as contradictory as it is to Oppenheim's tenet, it would nevertheless be illogical to claim that speed of orthodontic treatment prognosticates permanency of established occlusion. But slowness and gentleness of treatment will not necessarily guarantee that our efforts will be fruitful.

The tooth receiving the most intense pressure was submitted to the forces for only thirty days, ten less than the other teeth were influenced and with which he compares it histologically, a discrepancy of time sufficient to vitiate the validity of any conclusions drawn from the comparison. In case of this tooth, Oppenheim found on the labial side of the pressure little or no resorption, on the lingual side only scant deposition, with only sporadic appearances of osteoclasts and osteoblasts. In the vessels of the periodontal membrane, he found homogeneous masses which might be either thrombi or artifacts, but since these did not appear in the other sections, he concluded that they must be thrombi. The periodontal membrane on the side of the pressure (the only one illustrated) showed a decrease in cellular elements. We are not told whether the tooth loosened or was made more or less loose than the other teeth more gently treated. If we are to presume that it did loosen, then its greater freedom in the socket would no doubt be due to degeneration of the periodontal membrane, for he emphatically describes the bone as practically unchanged.

Oppenheim pleaded for slow movements and for prolonging the influence of gentle forces when tooth movement was difficult just as Angle had when he introduced the pin and tube appliance which really exerts delicate forces.

In making these first conclusions Oppenheim not only went far beyond what his findings would justify but also failed to lay a proper rational foundation for his conjectures on prognosis, since he did not rule out etiologic factors which may still be present during treatment. He makes no mention of etiologic forces in either his report in Grünberg's translation or in the 1911 report. He does not state that, in drawing his second conclusion, he takes for granted that causal forces have subsided. In this conclusion he must have projected clinical prejudices and the enthusiasm of his associates when he voiced the claim that fast treatment requires longer retention, regardless of everything else. It seems to me that habitual pressures applied against the jaws and teeth could cause relapses no matter how gentle the treatment, no matter how long the retainers were worn. It is true that etiologic forces, whatever they may be, will develop malocclusion after the mouth has pro-

gressed fairly normal up until the age of twelve or fourteen years. This being true, it seems that permanency of results does not depend exclusively upon the quality or quantity of bone induced by skillful manipulations of gentle forces.

His third conclusion which relates to elongation and depression of teeth in their sockets is justified by the facts he disclosed.

His fifth conclusion regarding the *ligamentum circulare* to which he ascribes some relapsing movements, especially mesiodistally, is not justified by a study of his slides because he did not deal with such movements. The relation of the dental ligament and the periosteum to the positions that teeth take and maintain after orthodontic treatment needs investigation. What makes a rotated tooth, as a premolar with sufficient room in the arch, tend to return quickly to its former position after being turned by orthodontic procedures?

His sixth conclusion favors applying the mildest forces which are best derived from springs. Continuous springy forces, comparatively speaking, cannot be derived easily from the appliances he used.

In his seventh conjecture, he claims that he has proved the purpose of orthodontic retention saying, "We must retain so long until the bone concerned is functionally orientated again under the influence of normal function," although he did not make any sections of teeth which had been retained in occlusion. By the term function, I presume he means principally the chewing uses of the teeth, not the metabolic functions of dental tissues. Bone formation is not due completely to mechanical influences. It is affected by diet, sunlight and certain endocrinines, as has been adequately demonstrated repeatedly. But even so, bone formation can never be a criterion for retention, because if we can move teeth through bone by delicate forces, then habitual etiologic forces can move them back to their original positions or into new positions of malocclusion.

In summarizing the facts gained in Oppenheim's work, all that he showed was that orthodontically induced lamellae, which are short, tend to run at right angles to the length of the moved tooth, that is longitudinally to the lines of force, a fact new only as applied to teeth. His slides show that the bone is irritated by orthodontic forces (his gentle forces) a detail made plain by round-cell infiltration. One of his slides made from bone around a tooth submitted to strong pressure for thirty days instead of forty showed less transformation than those moved more gently for forty days. He showed that the alveolar bone is either elongated or shortened when a tooth is respectively elevated or depressed. He showed that recalcification takes place if the tooth relapses to its former position or if held steady in its new position.

It is regrettable that this incompletely described but promising work, clinical in most of its aspects, was further marred by interjecting conjectures into reports of it which were largely drawn from clinical experience with human beings, but which orthodontists have taken as facts. An investigation of the causal factors involved in root-end resorption, an issue raised chiefly by the exploratory work of Ketcham, will undoubtedly lead to a broader study of the reactions of all tissues enduring the pressure and stress of ap-

pliances. As regards root-end resorption of teeth having vital pulps, the first case called to my attention in the literature (Weis: *Dental Cos.*, 65, 1272) was in an individual who had never been treated orthodontically. Later reports, both published and unpublished, showed such occurrences in cases under treatment by various appliances.

Among the first conjectures made in connection with this work by one group of observers was that a fixed springy appliance providing stationary anchorage and producing bodily movements of teeth was the exciting cause of such erosion; by another group, that "jiggly" appliances stimulated the resorptive action. Orthodontists will be more interested in this investigation and be more willing to support it if they will realize that Oppenheim's work was incomplete and settled nothing regarding retention.

DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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TRANSILLUMINATION OF THE TEETH AND GUMS

BY STERLING V. MEAD, D.D.S., WASHINGTON, D. C.

TRANSILLUMINATION of the teeth and gums should not be overlooked as a diagnostic aid. There is a tendency among many physicians and dentists to rely entirely too much upon the roentgenogram and to forget the importance of the clinical examination, transillumination, pulp testing, etc. Transillumination as a diagnostic aid is indispensable, as in many cases it is the only positive way to detect the presence of infection.

The failure to detect shadows about the teeth and gums by transillumination, however, does not eliminate the possibility of infection, as transillumination for the purpose of disclosing periapical bone pathology is only reliable, where the pathology extends to the periodontal or soft tissues. My experience, however, proves that transillumination is extremely valuable as many pulpless teeth show periodontal infection, detachment of the tissues, etc., upon transillumination that are roentgenographically negative.

While there is no doubt of the value of the roentgenogram in disclosing bone pathology, it is of no value in showing pathology of the soft tissues. Roentgenology does not and cannot reveal congested areas in the periodontium in the earlier stages, and only indicates periapical pathology where there has been a decided change in the alveolar structures. It is therefore unsafe to assume that areas are dangerous simply because they are plainly shown by the roentgenogram. In many cases roentgenographic negative areas are the most dangerous from the standpoint of absorption of toxins by the patient. Transillumination is therefore our most valuable method for determining these more elusive conditions.

EQUIPMENT

Every dental or medical office should provide a suitable dark room for transillumination of the teeth, gums and sinuses. It is of vital importance that this room be completely dark. I have found a room three by five feet to be very convenient, and a room of this size can often be made out of a closet

or other small space. An ordinary white enameled chair should be placed facing the door with its back toward the wall. There should be a shelf for holding sterilizing jar with 70 per cent alcohol with a supply of extra bulbs. A wall mirror or large hand mirror should be convenient for showing the pathologic areas to the patient, as often one is able to convince a patient of the necessity for extraction or other surgical work in this manner when all other explanations and efforts fail. It is reasonable to expect a patient to understand more clearly by any method where they can see the effects of the pathology.

It is essential to have a light that may be sterilized and one that is not too frail or easily broken when putting into or taking out of the socket. The

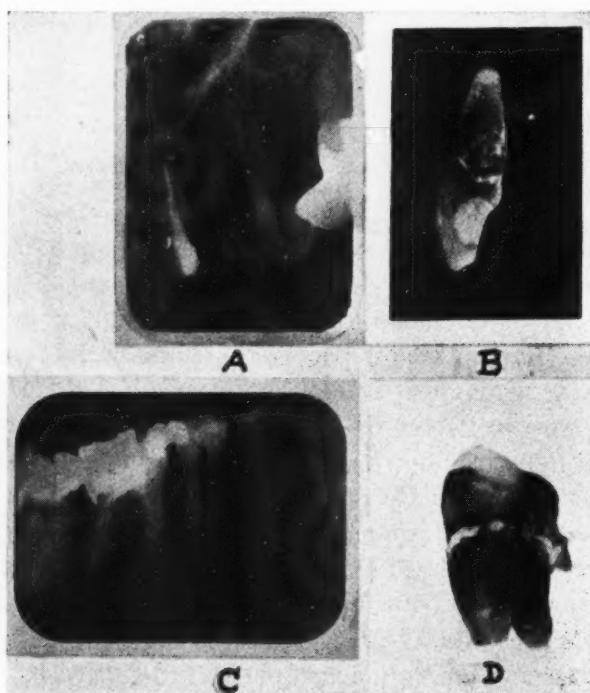


Fig. 1—*A.* Radiogram of upper central incisor. The tooth is pulless and has a root canal filling. There is no radiographic evidence of osteitis or bone pathology. The line of the periodontal membrane may be traced around the apex of the root without any widening of the space. Transillumination, however, showed a dark shadow and indicated tissue infection. The tooth was removed and definite infection found. *B.* Photograph of the incisor shown in *A*, showing the complete discoloration of the root, due to gangrenous condition of the periodontal tissues. *C.* Radiogram of lower first molar. The tooth is pulless and has root filling. There is no bone pathology shown. Transillumination, however, disclosed a dark shadow, indicating tissue infection. The tooth was removed and found to be infected. *D.* Photograph of case shown in *C*, showing the discoloration of the roots.

equipment should provide a graduated rheostat for control of the amount of light. The light should be cool and not easily overheated.

An extra set of bulbs should be immersed in antiseptic solution to insure having one always ready for immediate use. Lights producing too great a percentage of red and orange rays often fail to indicate congested areas, as lights designed for the white-ray searchlight principle seem to give the best results. The translucency in normal areas is undoubtedly due to the affinity of the white-ray light and its refraction and transmission in the normal circulation.

In the areas of congestion we have an absorption of these white rays and so a shade varying in size and shape with the area of involvement.

TECHNIC

In the dark room a small incandescent lamp when placed in the mouth may disclose many pathologic conditions, if present.

In transilluminating the teeth, the light should not be held directly against them, but should be held lingually or buccally one-half inch or more away. The entire alveolar process and the teeth should be transilluminated from both the buccal and the lingual surfaces with light of varying degrees of intensity. In some cases small diseased areas will show up under a faint light that would not be detected with a stronger light. The light may be used to examine the teeth and gums to detect cavities, foreign substances, fistulas, lesions, growths, etc. The mucous membrane of the entire mouth and the tonsils and throat should be examined. Where it is desirable to have the light concentrated, a piece of rubber tubing may be used over the end of the light.



A.

B.

Fig. 2.—Case of Mr. H. A. Radiogram of upper central incisor. There is no definite bone pathology shown. Transillumination showed a definite shadow due to infection, and tooth was extracted. B. Photograph of the central tooth shown in A after extraction. There is granulomatous tissue shown on the lingual surface of root. This was hidden from the roentgen ray by the tooth structure. The root is roughened and discolored and the periodontal tissues are destroyed. C. Photomicrograph of tooth (x 12) showing resorption of apical tissue and destruction of periodontal membrane. Photomicrograph (x 170) showing cross-section of periphery of tooth, which shows destruction of the periodontal membrane. D. Photomicrograph (x 160) of tissue from granulomatous growth shown in A, which shows the characteristic hypertrophied epithelial tissue and round cell inflammation.

Modern dental diagnosis is dependent upon three noteworthy steps which have been developed during the many years that dentistry has been a science. These three steps are the roentgen ray, transillumination, and the vitality-test, and it is only by the use of all three, considered with other clinical findings, that the fullest perfection of technic can be attained.

In my practice transillumination of the teeth, gums, and sinuses is the first step in my scheme of diagnosis. The results of the findings are recorded on a suitable chart. A full mouth roentgenographic study is then made. The patient is then called back for final examination, when questionable teeth are tested for vitality; the mouth is examined carefully and such further diagnostic measures taken as are necessary.

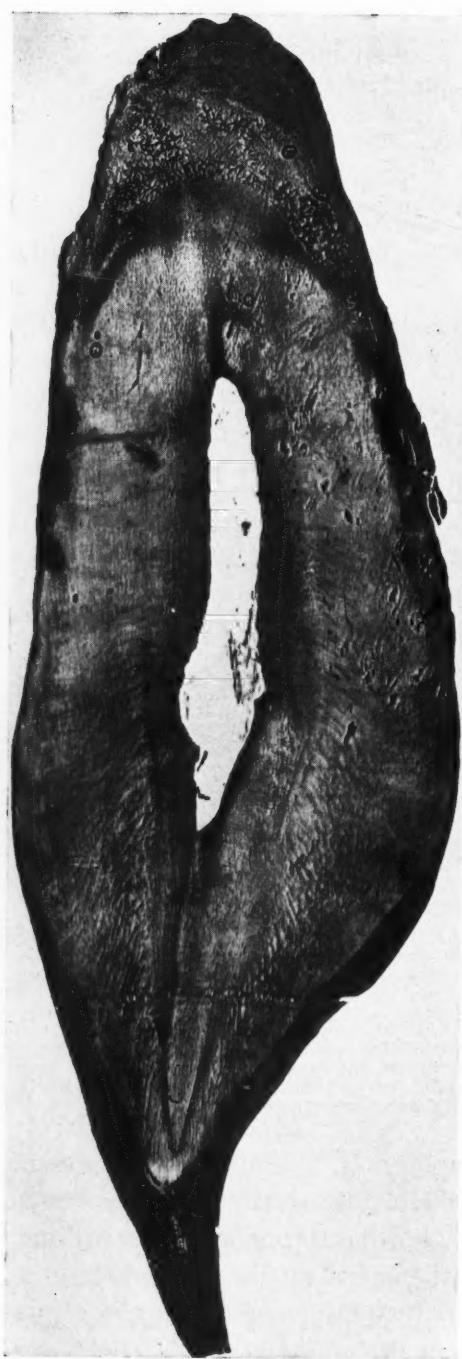


Fig. 2-C.

The alveolar process in all areas where the crown of the tooth lacks the normal translucency under transillumination should receive careful inspection. In other words, teeth with large fillings and those with gold crowns may not always show large areas under transillumination, yet a careful search

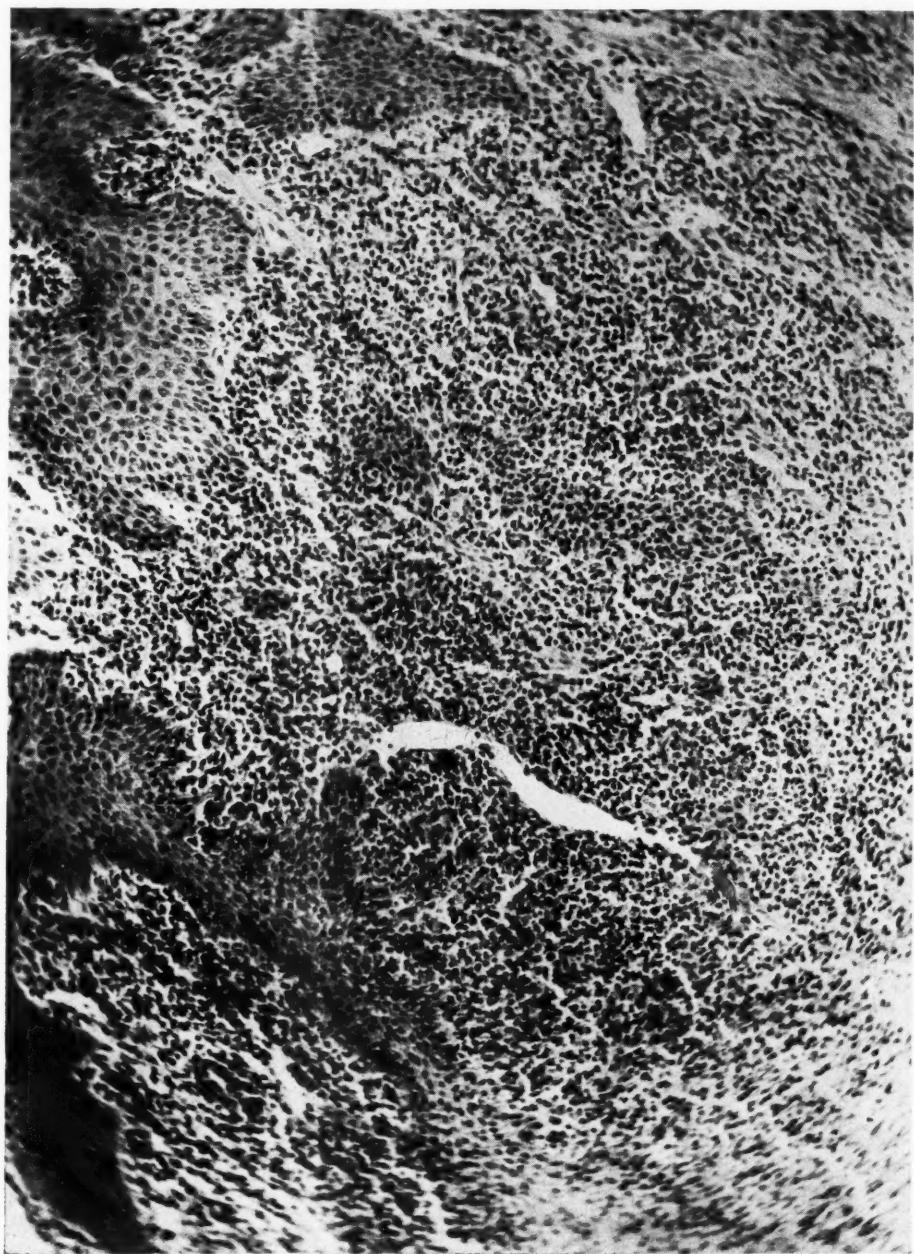


Fig. 2-D.

on both the buccal and lingual surfaces will frequently indicate areas of change.

Too much light will frequently flood small areas that would be readily apparent with less light. Any shadow apparent under transillumination is evidence of a morbid condition.

PRINCIPLES OF TRANSILLUMINATION

Briefly, transillumination may be explained as directing a highly concentrated, tissue penetrating, equi-chromatic light through the process under examination. The transmission of this light through the process, by virtue of reflection and selective absorption enables us actually to see what conditions exist.



Fig. 3.—Case of Miss W. *A*, Radiogram of lower left second molar. There is no definite bone pathology shown. Transillumination disclosed a definite shadow due to infection. The tooth was removed. *B*, Photograph of tooth shown in *A*. The entire root is discolored and rough, due to the destruction of the periodontal tissue. *C*, Photomicrograph of root (x 14) showing hyperplasia of cementum. *D*, Photomicrograph (x 170) of periphery of root showing hyperplasia of cementum. *E*, Photomicrograph (x 2280) of tissue from periphery of root showing streptococci.

When no infection is present the light is evenly transmitted through the process, showing a clear pink translucency. When congestion is present, however slight, an opaque or darkened area is distinctly visible within the transilluminated region. This opacity, present only with infection or traumatic injury, is startlingly distinct.

The theory of diagnosis by the use of transillumination is based upon the change or deoxygenation shown in the blood content when pathology occurs. A normal condition is indicated by a clear pink translucency. Dark areas



Fig. 3-D.

(nontranslucent shadows, discoloration, or opaque areas) always indicate infection. A dark area is never shown by the roots of healthy teeth or by chemicals, fillings, gutta percha, etc., in the roots. Shadows due to infection about

the teeth remain even after the removal of the teeth until after free drainage is established. Congestion present with bacteriologic infection of the alveolar process and teeth is rarely, if ever, dissipated through the circulation.

In many cases the discolorations that are present before extraction will remain after the removal of the tooth, proving that a morbid change has taken place outside the tooth structure and that the presence of these discolorations is due to areas of stasis and not to mechanical causes, such as chemicals or root canal fillings.

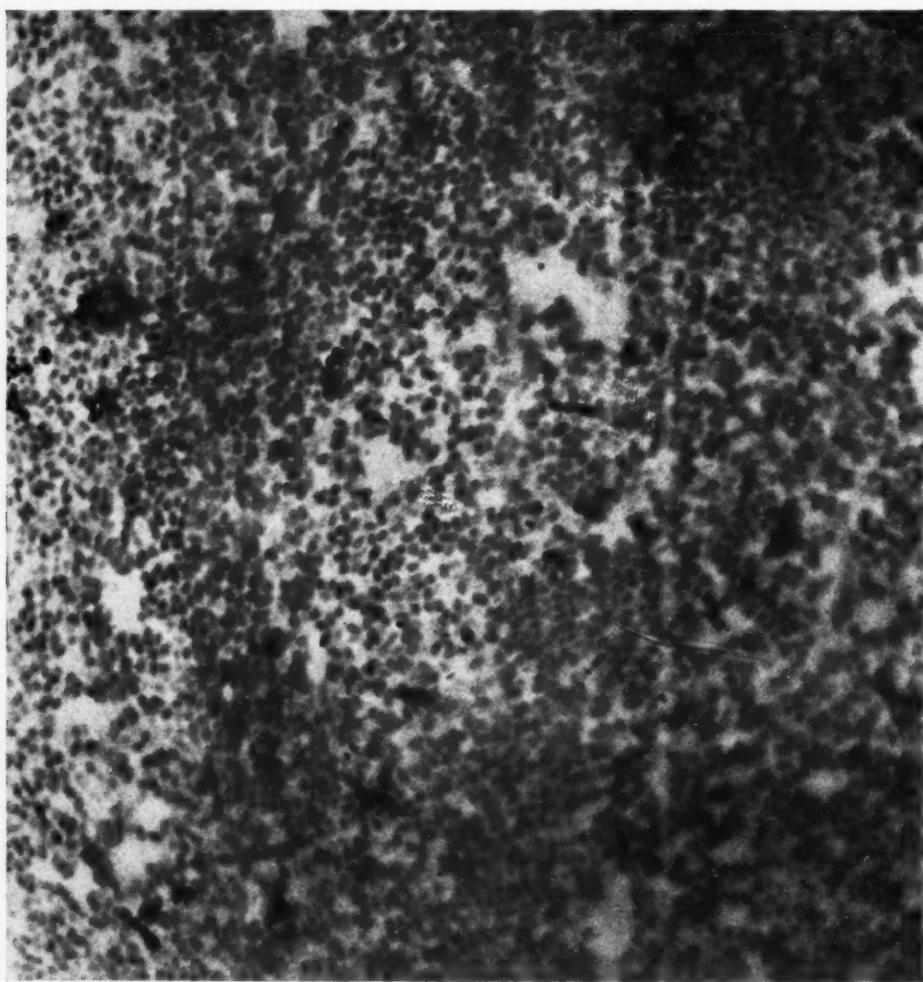


Fig. 3-E.

In this respect, transillumination is of additional value, for by observing the gradual change to normal translucency in the area of extraction, the diagnostician has a definite means of knowing when congestion has been eliminated. When these areas show complete restoration to healthy coloration, the dangers of residual infection may be assumed to be past.

If argyrol or silver nitrate is painted upon the root of a tooth after extraction and the tooth placed back into the socket, or if the drug is placed into the socket after extraction, transillumination will show a shadow for a

few hours, but this effect soon passes away. This experiment, however, would not be applicable with a normal tooth as the drug would not permeate the periodontal tissues.

The blood in the soft tissues of the mouth shows even the slightest change. The healthy red corpuscles are translucent; but when infection causes congestion, oxidation, and deoxidation of these corpuscles, a dense area is created, which appears darkened or opaque and can never be mistaken when viewed by transillumination.

The basis, therefore, for the theory of diagnosis by transillumination is that throughout the varying stages of pathologic evolution from the healthy dental process to the well defined abscess, there are many variations which cannot take place without a change in the blood content.

Nontranslucent areas (commonly called shadows, discolorations of opaque areas) always indicate infection, such as abscess, cellulitis or periodontal disease. These opacities are clearly defined, readily apparent on examination, and cannot be confused with the clear translucency of the healthy process. The area involved is indicated by the size of the shadow.

Infection of the most virulent type may be indicated by a shadow of very moderate size and density. The purpose of diagnosis by transillumination is to locate dark areas, and when these are present, a pathologic condition is definitely established.

Infection shown by transillumination is one of the easiest and best methods of convincing the patient of the existence of disease. One of the early signs of periodontal disease is a discoloration of the gum tissue under transillumination which is decidedly different from the normal healthy translucency.

Consideration of an ordinary abscess on the toe or finger will afford a comparison to dental conditions. After the initial infection we have the hyperemic stage, with redness, swelling, soreness, pain, throbbing and fever. Then, within seventy-two hours we have the congestion evidenced by discoloration, which remains until drainage is effected. To a certain degree, conditions at the roots of infected teeth are similar. However, dental infections are not usually so acute as with an abscessed finger or toe, because of the limited supply of blood in the alveolar process and the possible difference in the nature of the infection.

Congestion due to acute periapical infection, such as would be caused by putrescent pulps, etc., is evidenced by shadows during transillumination within seventy-two hours after inception. Congestion due to acute and chronic periodontal infections is also apparent within seventy-two hours. In some cases a cellulitis will cast a shadow by transillumination within twenty-four hours after inception.

There may be an acute inflammation and swelling of the cheek or jaw, due to an infected tooth, with no opacity during transillumination because the congestion has not yet localized.

Practically all periodontal diseases, cellulitis, and fistulas are disclosed by transillumination, but a periapical disease without an involvement of the periodontal tissues extending toward the gingival margin or a fistula is usually not shown.



Fig. 4.—Case of Mr. B. A. Radiogram of lower left second bicuspid showing slight periapical abnormality. Transillumination, however, showed a definite shadow due to infection, and the tooth was removed. B. Photograph of the tooth shown in A. The root is discolored and roughened. The apex shows resorption of cementum. The peridental tissues were destroyed. C. Photomicrograph (x 12) showing abnormality of the dentine, cementum and peridental membrane. D. Photomicrograph (x 170) showing periphery of the cementum and partial destruction of the peridental tissues.

VARIOUS USES OF TRANSILLUMINATION

The best results in modern dentistry are obtained in the field of prophylaxis and preventive dentistry. Treatment is especially effective in incipient periodontal disease. Every dentist and physician should be equipped to make examinations for these conditions, and this can best be done by the use of transillumination.



Fig. 4.-D.

By transilluminating at the gingiva, calculous deposits are easily distinguished by crescent-shaped shadows of varying size and density. These areas provide a fertile field for the inroads of periodontoclasia. The first evidence of abnormal conditions at the gingiva, and the forerunner of pronounced

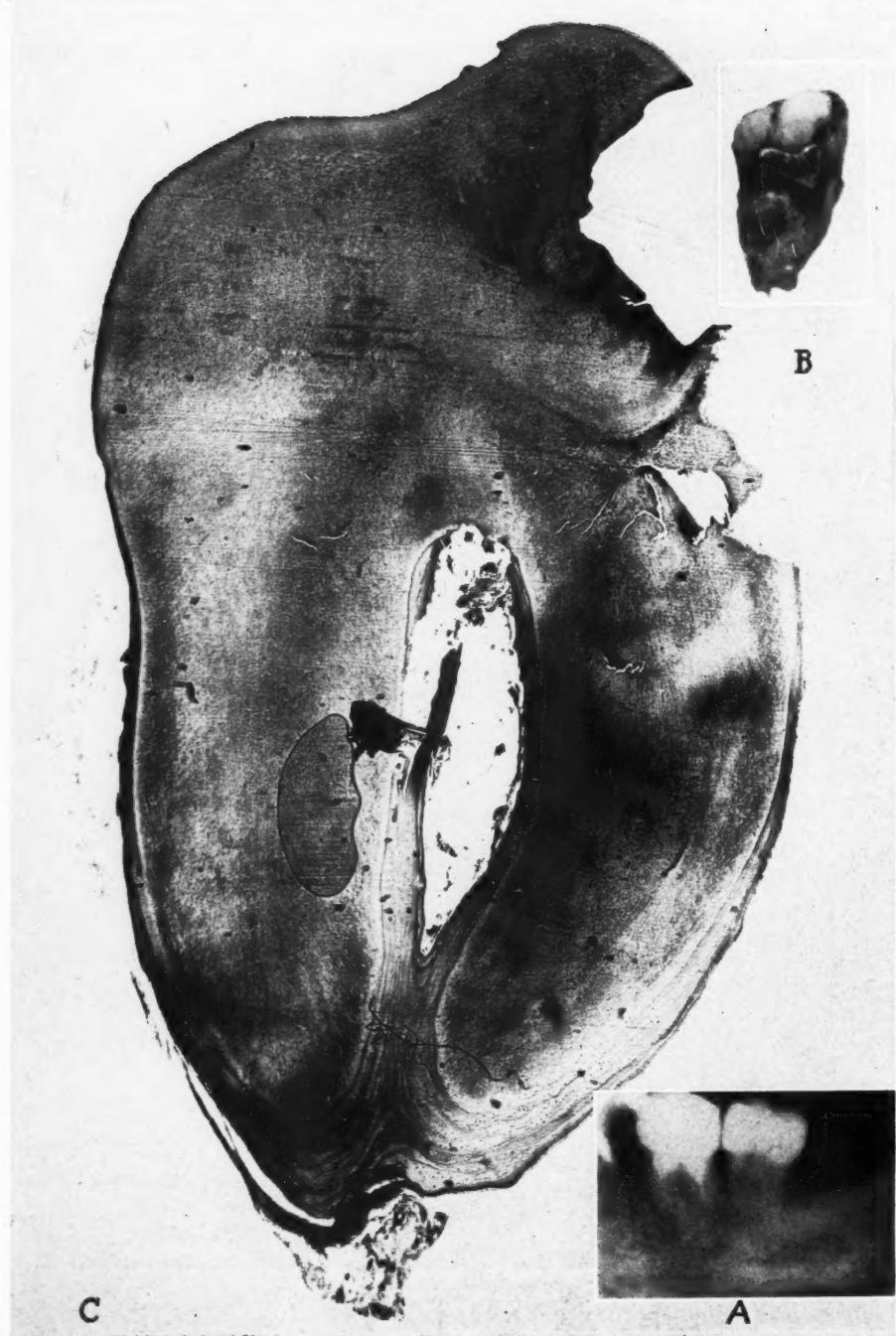


Fig. 5.—Case of Mr. B. *A*. Radiogram of lower right second molar. There is no definite pathology shown. Transillumination, however, disclosed a definite shadow due to infection, and the tooth was removed. It was found to be infected. *B*. Photograph of tooth shown in *A*. The root is discolored and roughened. The peridental tissues were partly destroyed and the apices of the roots partly resorbed. *C*. Photomicrograph of tooth (x 13), showing hyperplasia of cementum. Part of the peridental tissue is shown at the apex.

periodontal disease is lack of translucency, and even in the incipient stages of the disease, a discoloration of the gum tissue, decidedly different from the normal healthy translucency, will be noted by transillumination. Many patients refuse to believe that they have periodontal disease unless there is pronounced suppuration. By the use of the light and a probe, the diagnostician can reveal obscure conditions in the early stage to doubting patients, and in this way emphasize the necessity of treatment in time to save the teeth.

Transillumination also serves to indicate the progress of prophylactic procedure, and in this way reduces the danger of traumatism from instrumentation. Occasionally periodontal conditions, accompanied by sponginess of the gums and destruction of the periodontal membrane, are indicated by a bright crimson line along the interseptal tissue and this deviation from normal healthy translucency is immediately evident. This shows the first indication of a congested area before breaking down of the corpuscles has set in, and consequently no pus or débris has accumulated to create a dark-shaded area by transillumination. As a diagnostic aid, transillumination far excels roentgenography in these early stages of periodontal infection.

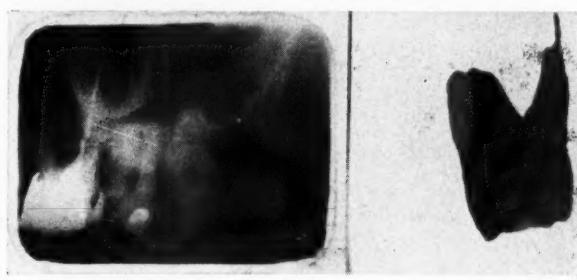


Fig. 6.—Case of Mrs. P. A. Radiogram of upper right first molar. There is no definite pathology shown, except what appears to be root filling in lingual canal extends through apex. The tooth borders the maxillary sinus. Transillumination showed heavy shadow due to infection, and tooth was removed. B. Photograph of first molar shown in A after extraction. It was infected and the lingual and one buccal root were badly discolored; a broach is shown extending through the apex of the lingual root.

Transillumination can also be used effectively for the detection of interproximal cavities, intercoronal caries and the extent of fillings in the crowns of teeth, etc. The dentalamp is also of value in locating areas of recurrent decay, which, due to decalcification, are indicated at margins of fillings by differences in lustre and color. They are easily shown to the patient, and quickly proved by the use of a scaler or explorer.

Because of the proximity of the maxillary sinuses to the dental process and the relation of the frontal to the maxillary sinuses, there is frequently an extension of infection from one to the other, emphasizing the necessity for accurate diagnosis. Transillumination is also of advantage in root canal operations to observe the progress of instrumentation.

Transillumination is especially valuable in the recognition of diseased areas about the teeth in the mouths of children. The roentgenogram in cases of this kind is most often unreliable because of incomplete root formation and inability to differentiate between physiologic and pathologic conditions about

the roots of deciduous and permanent teeth and around the crowns of deciduous teeth over erupting permanent teeth. As the roots of these teeth have not fully developed, the canals are usually larger at the apex than at the pulp chamber, and only soft tissue exists at the root end. If infection is present treatment would be useless and the teeth are therefore extracted. In many cases it is impossible to obtain a good roentgenogram for a child, and transillumination may prove entirely satisfactory.

A transillumination outfit is a very convenient method of examination of the mouth, gums, teeth, throat and sinus, when a patient is confined to bed or in a hospital. In many of these cases a roentgenogram is not available.

VARIOUS TYPES OF OPAQUE AREAS

We do not always know from transillumination alone to what degree teeth proximating these dark areas are affected, and this makes quite necessary the use of the vitalitester.

Shadows on single-rooted teeth may only be noted on either the buccal or lingual surface, and so closely simulating the fillings of the root canals as

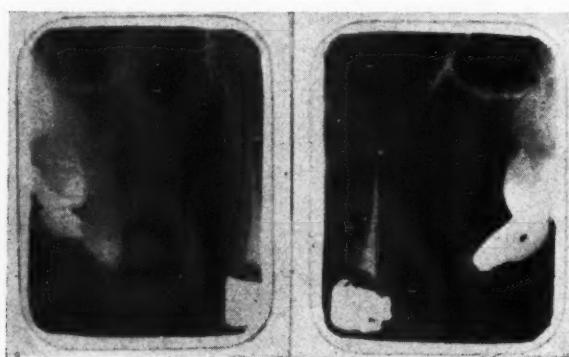


Fig. 7.—Case of Mrs. B. Pathology disclosed by radiogram which was not shown by transillumination. *A.* Radiogram of upper left central. *B.* Radiogram of upper right central.

to create confusion in the minds of some, but the fact that these shadows are only visible in certain instances, from either the buccal or the lingual surface, proves that they are due to breaking down of the periodontal membrane on either the anterior or posterior surface, as indicated by their position. These opaque areas take many different forms because the shadow represents simply the evidence of the localization of the infection.

MISCONCEPTIONS

The first thing that seems to occur in the mind of a person when introduced to the transillumination idea is, that fillings or chemicals used in treating root canals will cause discoloration of the dental process. The roots of healthy teeth themselves do not give the faintest darkened area when transilluminated, and neither can fillings or chemicals used within the roots.

Even a cursory inspection of an infected area when viewed by transillumination proves that it is the congestion and not the root of the tooth that creates the opacity, for the darkened area extends beyond the root and when

an infected tooth is removed, the opaque area indicating the infection is still present, and continues until the congestion itself has been eliminated.

Invariably shadows are present where we have chronic congestion around the teeth.

It is well known that congestions due to blind abscesses are frequently evidenced by visual inspection of the areas in good light even without transillumination. These discolorations of the gum tissue are always considered authentic proof of infection.

LIMITATION AND DEFICIENCIES OF TRANSILLUMINATION

There are many diseased conditions which may not be indicated by transillumination, such as periapical infection without involvement of the soft tissues surrounding the root, acute pulpitis in the early stages, early acute inflammation of the soft tissues, fractures, malformations, impacted and unerupted teeth, etc.

Not all infected areas even in the soft tissues are shown by transillumination. While a fistula is usually easily discerned by transillumination, occasionally a case is seen where it does not produce a shadow, depending on how complete the drainage is.

It is very difficult in some mouths to examine the mandibular third molar area with a mouth lamp successfully.

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CASE OF A DENTIGEROUS CYST

BY GEORGE F. SEEMAN, D.D.S., NASHVILLE, TENN.

PATIENT.—A. H., Lewisburg, Tennessee, aged forty-five years, diagnosed as having cancer. X-ray examination reveals dentigerous or follicular cyst involving nasal cavities and almost extending into the maxillary sinus on the right side. This cyst was infected by previous opening. The patient first noticed a bulging of the upper lip and alveolar process, having worn full upper and lower dentures for several years. Patient was operated upon and



Fig. 1.

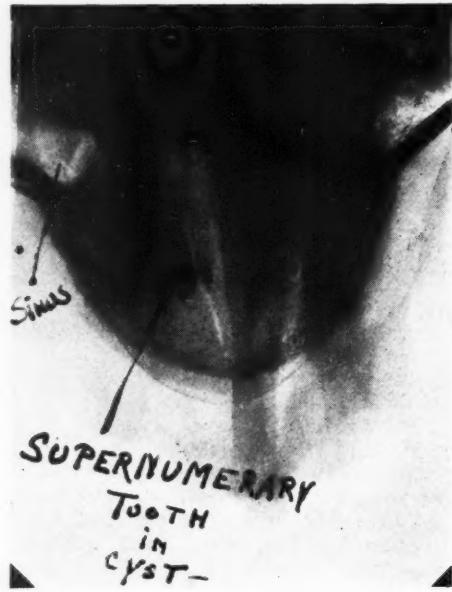


Fig. 2.

Fig. 1.—Shows dental x-ray taken at an angle for the upper incisors, revealing cystic area and supernumerary tooth with coronal portion towards nasal cavity.

Fig. 2.—Shows x-ray with occlusal view taken at a vertical angle, showing supernumerary tooth and destruction of the palatine bone distally.

flaps sutured on the ridge where initial incision was made. A window was cut above this for drainage, and dressing was continued for several weeks. Pictures show case after enucleation of cyst, also radiograms of case. The larger film or Fig. 2 shows the extent of destruction distally, while the other dental films were made as one would ordinarily x-ray the superior incisors.

This case brings out the importance of thorough examination before making a diagnosis; also, had this case been x-rayed at the time of extraction, this cyst could have been located, and saved the patient additional worry. The destructive process also could have been checked.

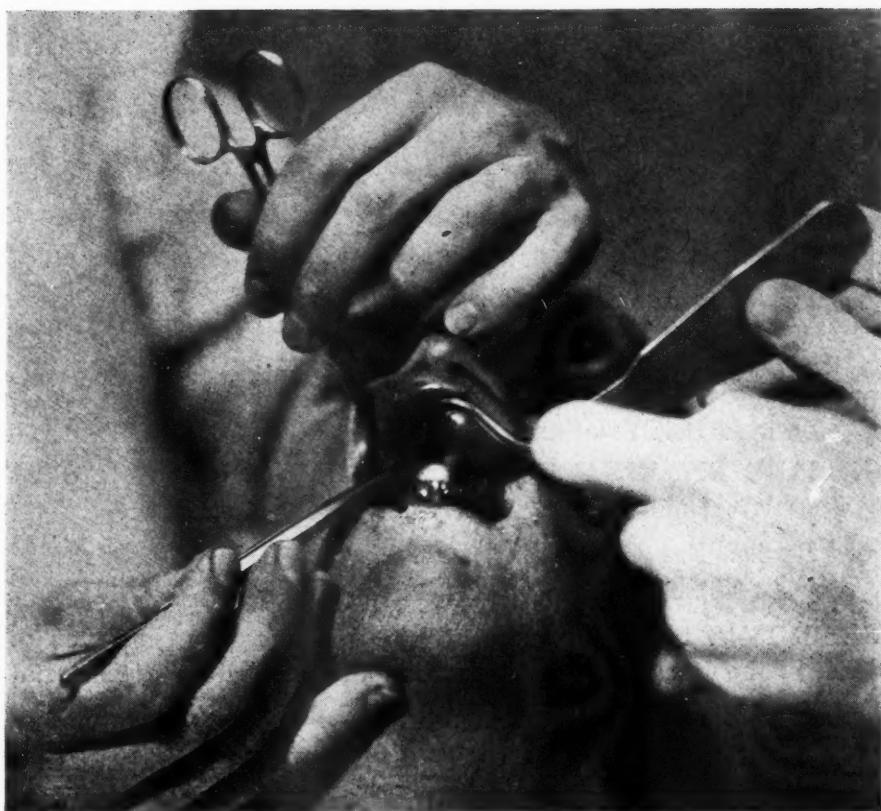


Fig. 3.—This photograph shows the large cavity after operation of removing cyst.



Fig. 4.—The photograph shows case after flaps were sutured to place.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

**Edited By
Clarence O. Simpson, M.D., D.D.S., F.A.C.D.,
and Howard R. Raper, D.D.S., F.A.C.D.**

THE ADVISABILITY OF A COMPLETE AND PERIODIC RADIOGRAPHIC EXAMINATION OF ALL ORTHODONTIC CASES*

By DR. FRED R. BLUMENTHAL, BOSTON, MASSACHUSETTS

IN PRESENTING to you my paper, I shall endeavor to show you definite evidence of the necessity of radiographing all cases, before, during, and after treatment. Further, I shall attempt to show you definite evidence why you should completely radiograph all cases which come under your care for observation or for active treatment,—children at the ages of three, four, or five years, regardless of whether you find clinical evidence of malocclusion.

Firstly, I believe that it is absolutely imperative that the diagnostician be thoroughly familiar with the anatomy of the part at the time at which it is radiographed. Frequently, the radiologist makes a diagnosis of impacted canine teeth, or finds insufficient space to allow those teeth to erupt. He then advises the use of orthodontic appliances to stimulate growth of the maxillae. Again, certain wisdom teeth are diagnosed as impacted or are inevitably to become impacted, due to their inclination and position in the maxillae. Immediate extraction of these teeth is then advised, these diagnoses being made at the age of eight, ten, twelve years. I shall show you from my series of periodic radiograms, following the development of the teeth and jaws at the various ages, that many of these are not really impactions, but rather Nature's wonderful and beneficent arrangement for stowing away, neatly and compactly, her future appendages, while awaiting the time for normal development and eruption, with the growth of the maxillae.

Fig. 1 shows the skull of a child, approximately six years of age, and which from all indications may be considered normal. Let me state here that, throughout my paper, I shall use the term normal, understanding, of course, that it has a wide variation and, truly speaking, must be the individual normal, but for the sake of comparison, I must have the liberty of expressing the deformities in a comparative manner to that of what I would hypothetically consider normal. Now in this illustration, note the apparently normal position of the maxillary permanent canine tooth. Note that at this age it lies high

*Read before the New York Society of Orthodontists, New York City, March 14, 1928.

in the maxillæ, close to the orifice of the nose and that it is overlapped by the root of the deciduous canines—partly by the crown of the permanent first premolar. Oftentimes, I have seen it overlapped by the crown of the permanent lateral incisor. Note the small space, at this age, between the crown of the permanent lateral incisor and the crown of the first permanent premolar. Now, if a radiogram is taken of the child at this age, one can readily appreciate how the shadows cast might indicate an overlapping of the crown and roots of these teeth, and how the inexperienced radiologist might state that the permanent canine had insufficient space to erupt, and that mechanical stimulation should be at once engaged. Note now, the relation of the second molar imbedded in hard tissue and lying partly in the ascending ramus of the mandible. Note also the inclination of the crown with especial reference to the parallel relation of the occlusal surface to the free border of the mandible. It is around these points which I am showing you in the skull, that I shall elaborate my paper and make definite comparison.



Fig. 1.

Fig. 2. The variation in the calcification period of the permanent tooth buds is unbelievably wide. The time allotted to this paper will not permit me to go into any lengthy discussion of any individual teeth, but I wish to state that the points which I cover can be substantially verified by hundreds of radiograms which I have in my file. In Fig. 2, the upper radiogram is of a little patient of mine at the age of exactly three years. You will note the calcification of the first molar, the slight calcification of the mandibular first premolar, and hardly any calcification of the mandibular second premolar. The lower radiogram shows the same child at the age of four years and three months. You will note the calcification of the mandibular first premolar, the second premolar and the increase in calcification of the first molar. Yet, at this age, four years and three months, in this particular child we have no evidence of the calcification of any second molar. It must be borne in mind that this child may never have any second molar but this is most rare and I shall prove that fact later.

In Fig. 3 the upper radiogram is of a child exactly five years of age and in comparison to the previous radiogram, there is only a difference of nine months. You will note the marked calcification of the first and second premolars, the first molar, and a marked presence of a second molar. The lower

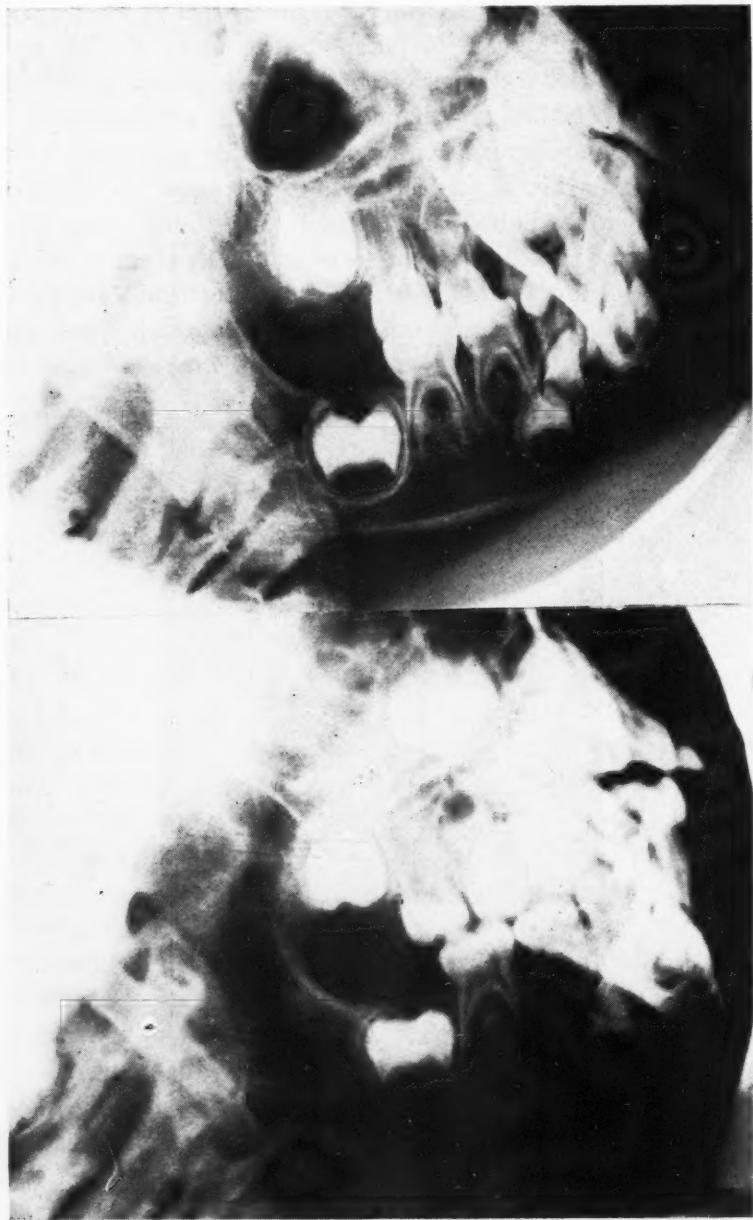


Fig. 2.

radiogram shows the same child at the age of six years. You will note, at this time, that the first molar has erupted to the level of the occlusal surface of the first and second deciduous molars. You will note also, the slightly increased calcification of the second molar. Calcification of the individual teeth varies at different ages.

In Fig. 4 is shown a child seven years of age. In the upper radiogram, note the development of the first and second molars and as yet no indication of the third molar. The middle radiogram shows the same child at eight years of age. Note now the appearance of the third molar crypt, but as yet

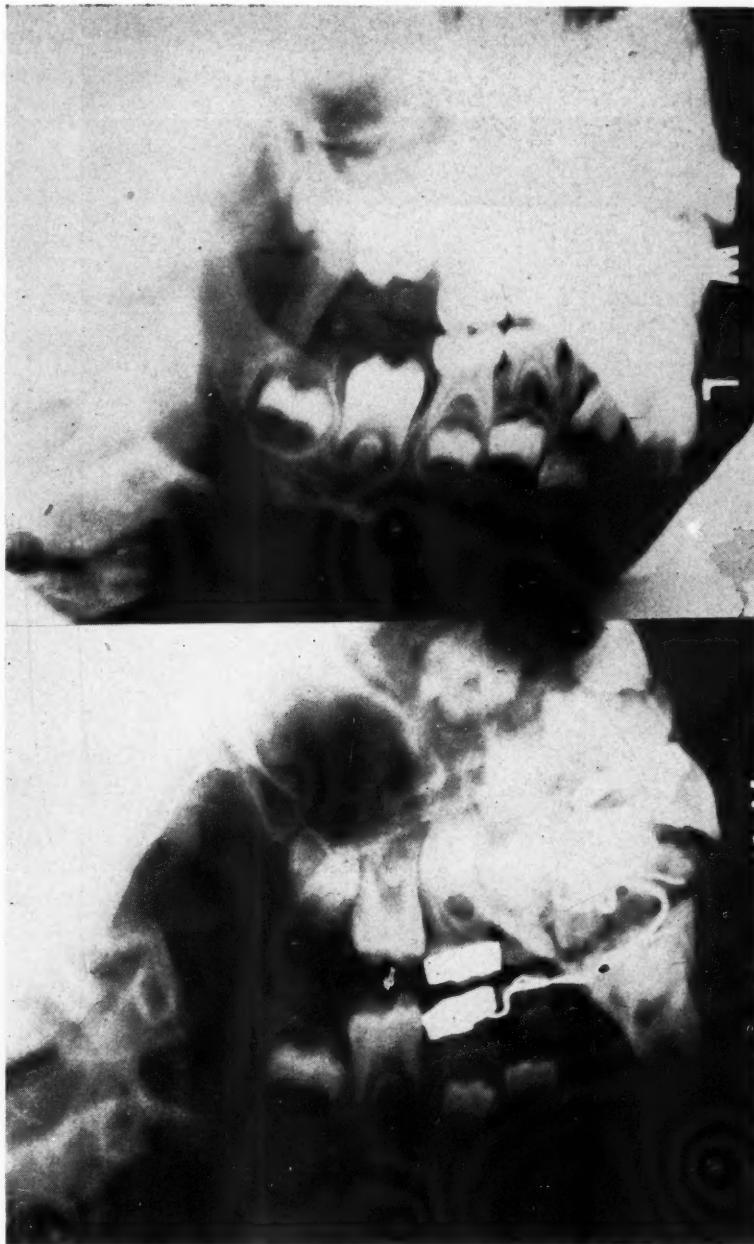


Fig. 3.

no calcification of the enamel. In the lower radiogram of the same child at nine years, note the marked calcification of the wisdom tooth, all in the short space of one year. It has been my observation that, in the majority of cases, the third molar does make its appearance between the ages of seven and nine years, but I have many exceptions to this. I might state as a point



Fig. 4.

of interest, that the maxillary third molars show their calcification in the radiogram at a slightly earlier period than the mandibular. It may be but a question of months.

Fig. 5 shows the development of a child from the age of nine and one-half years to twelve and one-half years. In this particular case, from clinical observation, the first molar began to appear through the gum at nine and one-half years, although from the radiogram it might seem that it was fully erupted at this age. At ten and one-half years, the first molar was com-

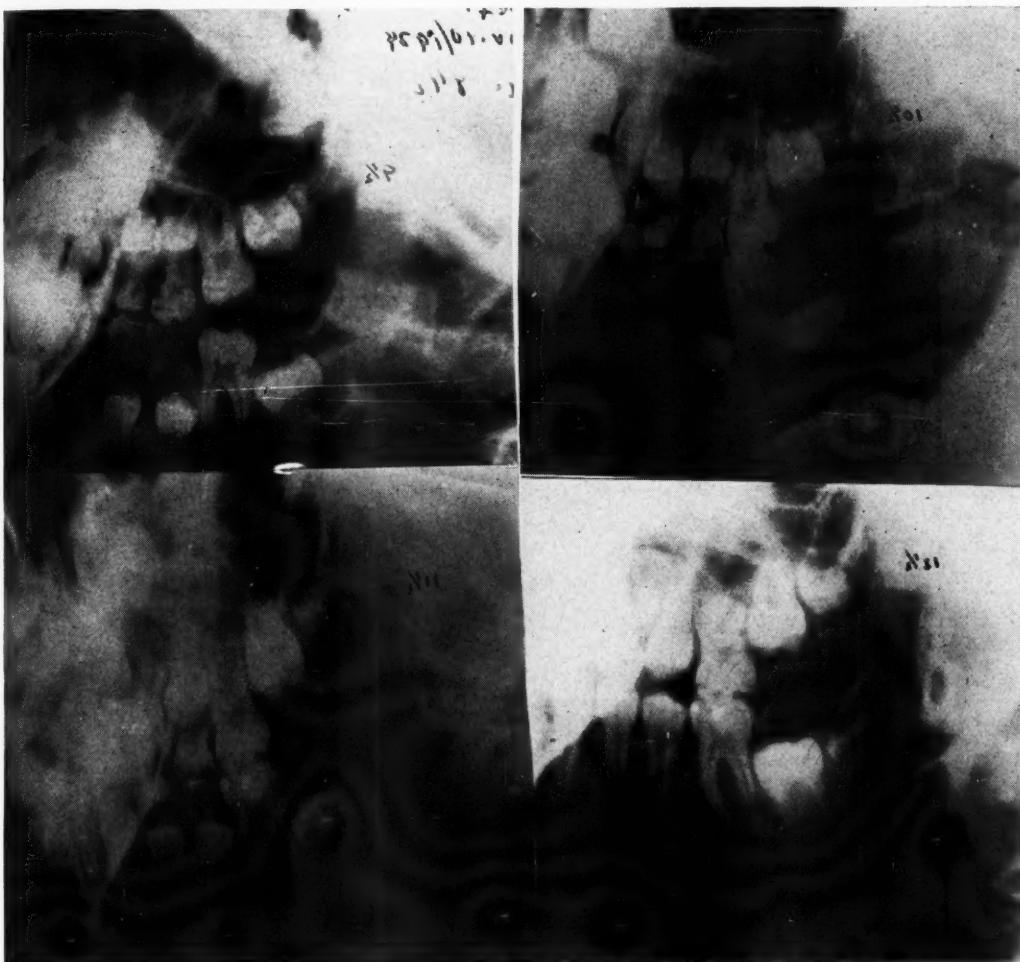


Fig. 5.

pletely erupted, but we have as yet no sign of the third molar. At eleven and one-half years you will note the first appearance of the third molar crypt, and at twelve and one-half years we have a definite calcification appearing, but at this age, no greater than shown in Fig. 4 of the child at the age of nine.

Fig. 6 furnishes us with a case report which I believe is quite unique and will demand your closest attention. The upper two radiograms show a pair of lateral jaw plates of the child at the age of six years. Here we have the development of the left and right maxillary first and second molars. We have the normal development of the mandibular left first molar and a

well-defined second molar, but on the mandibular right side, we have only the development of the right first molar, with absolutely no evidence, at this time, of any calcification of the second molar. The lower radiograms show the condition two years later. At the age of eight you see a well-defined crown of the right mandibular second molar appearing. How do we account for this? There are many theoretic explanations; for instance, as to what tooth bud this may be, but later evidence will be anxiously awaited and will be reported at some future time.

Fig. 7 demonstrates the importance of radiographing children who come under our care for observation regardless of whether they have a deciduous

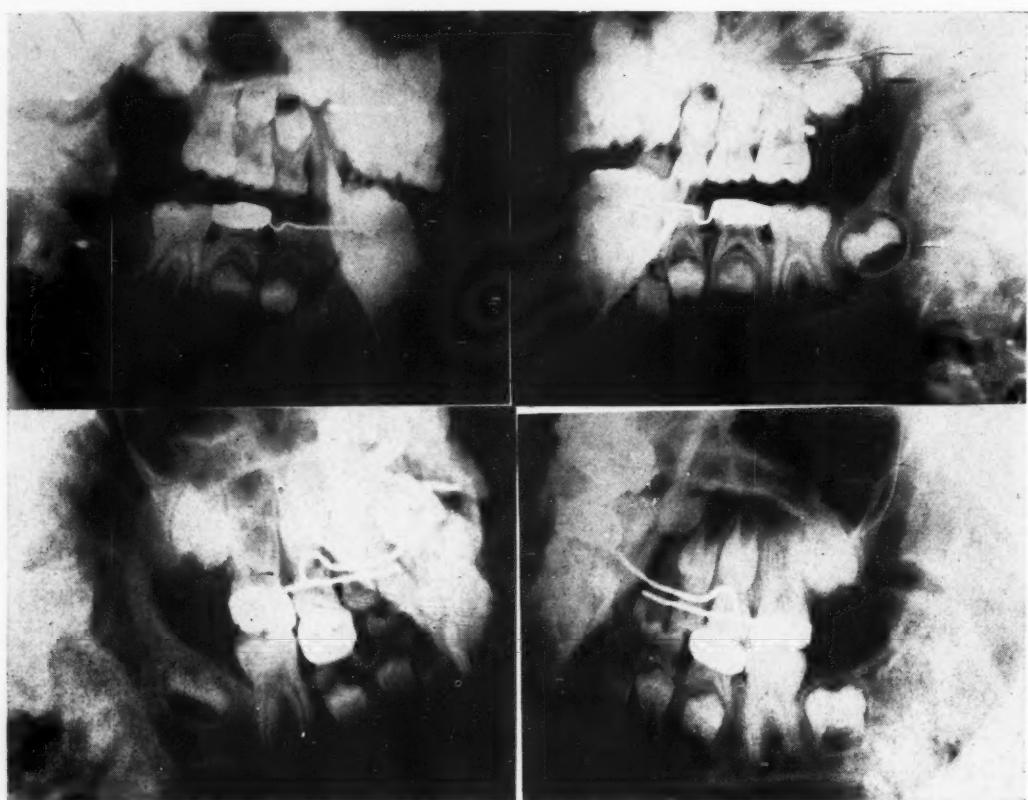


Fig. 6.

dentition, a mixed dentition or a complete permanent dentition. This little child, aged seven years, was brought to me by the mother who noticed that the mandibular central incisor was quite rotated and a condition which orthodontists know is not at all rare. In fact, it is quite common, and is a condition which in many, many cases will correct itself. However, upon examining the mouth, my attention was called to the fact that there were no signs of the first molar. Firstly, I assured the mother that this rotation of the tooth was nothing serious and that I would not advise orthodontic treatment immediately, for I felt that nature would greatly benefit this child's condition if left alone. I did, however, place the child under my routine system of examination which includes a complete radiographic examination and the

radiogram unexpectedly revealed the condition shown in Fig. 8, in which may be seen the reason for the noneruption of the first molars. A tremendously large cystic area, which has bulged and pushed distally the crown of the second molar, has eaten its way forward and has absorbed completely the distal root of the second deciduous molar. You will note the appearance of a cystic wall. Note the relation of the first molar to the lower border of the mandible, the thinness of the body of the mandible at this point. The child was placed in the hands of an oral surgeon who dissected away the pathologic material and allowed nature to do the rest.

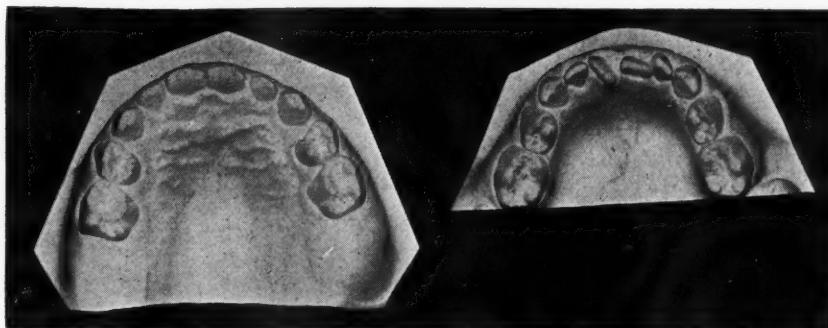


Fig. 7.



Fig. 8.

In Fig. 9 is seen a cast made just two months after the operation, showing the abnormal position of the first molar, yet I believe with nature's wonderful healing qualities we may expect to find this tooth improved eventually. This case proved to me the necessity of radiographing all patients, regardless of whether we are going to insert appliances or whether clinical evidence shows any definite abnormality. Had I waited another year for the first molar to erupt, we cannot foretell what serious injury might have occurred in this region.

Fig. 10. A boy was brought to me at the age of nine years because he had shown no signs of the eruption of the central incisors, though the deciduous incisors had been quite loose for some time. The radiograms show the presence of a dentigerous cyst. Note the crossing of the central and lateral incisors, also the importance of radiography, regardless of clinical manifestation before orthodontic treatment.

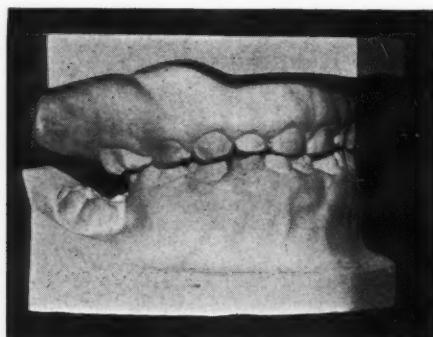


Fig. 9.

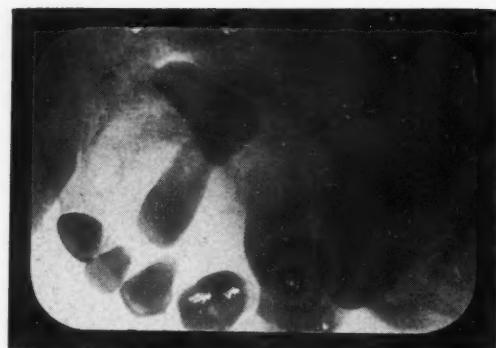


Fig. 10.

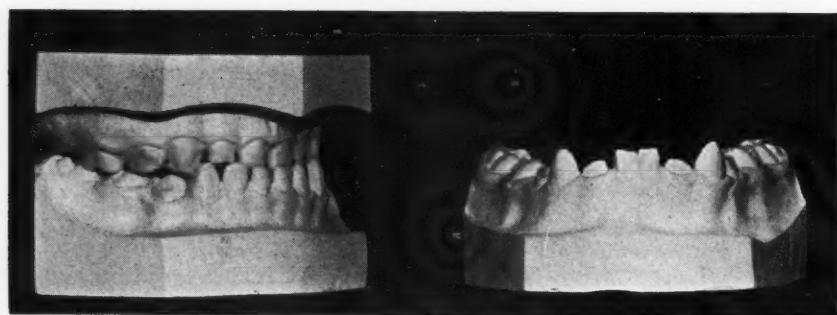


Fig. 11.

Fig. 11 shows practical clinical observations. In this paper I shall show you my errors in judgment and in treatment, as well as my fortunate discoveries. Here we have a very simple case of a child, aged seven years. In my judgment it was deemed advisable to place a simple appliance on the child to restore a more normal relation of the teeth and arches. After treatment for about seven or eight months, the maxillary anterior teeth were over

the mandibular anterior teeth and I thought my work well done. However, about one year later, the child was sent for, under my routine observation system, and I noticed two permanent teeth erupting in the mandibular lateral incisor region. It seemed quite strange to see the deciduous central incisors still present, but it meant nothing to me at first. I felt these teeth and found them quite firm. I immediately looked up my radiograms which I had taken when I had started the case and found that I had taken lateral jaw plates and a small film of the maxillary anterior region, but in view of the difficulty in placing the film in the mandibular anterior region, I disregarded this at the time. This brings out my point of the necessity of a complete radiographic examination. By complete, I mean every possible area with which we are apt to deal and for which we are responsible.



Fig. 12.

Fig. 12 shows my error. Had I taken my radiogram at the proper time, this condition would not have occurred. The central incisors, which were overretained, had forced these permanent buds to erupt in entirely abnormal positions. The simple removal of these deciduous central incisors at an earlier age would have allowed the permanent central incisors to erupt in their proper position. Now it was too late, and after as diplomatic an explanation as I could make to the parents, the deciduous incisors were removed. The case must now be treated by a corrective method, not from a preventive method as I had preached to the parents. I immediately had to put on bands and draw the teeth together. It was not a serious error, but a most embarrassing one, and one that could have been entirely avoided. It might be of interest to note, that, although these teeth were brought together very simply and very slowly, we have a marked and definite curvature of the roots of these developing central incisors.

Fig. 13. The congenital absence of tooth buds is not at all rare. You all have many cases of these under your observation. However, there are just a few types which I would call to your attention. Note the absence of the permanent successors.

Fig. 14 shows a most marked case of congenitally missing tooth buds. This child shows, clinically, the presence of but two spear-shaped maxillary deciduous central incisors. Upon radiographing the child, as far as I could make out, the child had no deciduous or permanent tooth buds in the mandible whatsoever. Upon radiographing from many angles, all I could find were those few peg-shaped teeth and the possibilities of one or two buds in the maxillae. I have not seen any report where there was a congenital absence of as many deciduous and permanent tooth buds.

Fig. 15. The question as to the advisability of retaining or extracting the second deciduous molars when they have no permanent successors is often considered. It is a very common condition today and I want to show you illustrations carried over a period of years. I shall not personally ex-

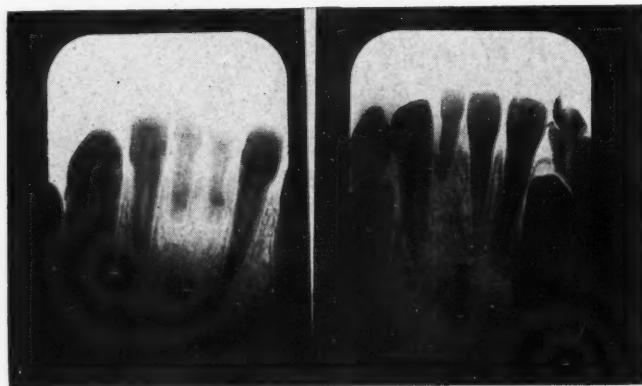


Fig. 13.

press my opinion as to the advisability of extraction or retention other than to say that the age of the patient, the facial lines, the condition of the adjoining teeth must be carefully considered before making a final decision. Fig. 15 shows a typical and frequent case of a second deciduous molar with no permanent successor. At this age, about thirteen years, may be noted well-developed roots and apparently no cavities in the tooth. Note the occlusion with the maxillary premolars, the large well-defined and developing wisdom tooth and then consider what might happen if the deciduous molars were extracted.

Fig. 16 shows cases ranging from the ages of eighteen to twenty-five, showing conditions as often found with these overretained deciduous molars. In the cases with missing mandibular premolars, the deciduous molars have become wedged between the permanent teeth. Also note the large area around the crowns where food might accumulate. The radiogram showing the maxillary deciduous molar, shows nothing but the condition as to fillings, etc.

Fig. 17. Case of a little girl. The upper radiogram shows the condition in 1924, at the age of twelve. You will note the second deciduous molars are



Fig. 14.

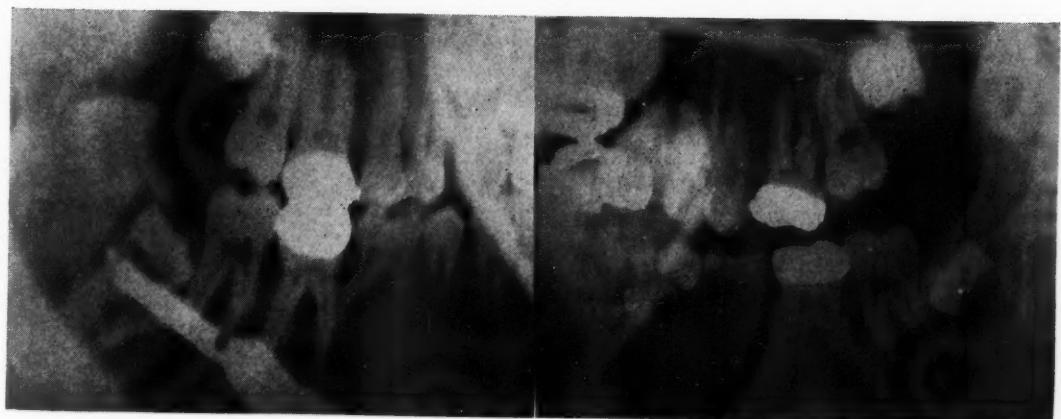


Fig. 15.

in quite a healthy condition and from my clinical findings, although it cannot be seen in the radiogram, there are practically no fillings. The lower radiograms show the same teeth after orthodontic treatment had been carried on. You will notice that the maxillary deciduous molars had bands on them and so I personally might be thought responsible for the breaking down of the enamel, but the mandibular teeth never had any appliance and you will note the absorption and rapid breaking down of the teeth and with extensive fillings. This leaves you to decide for yourselves the problem as to the advisability of retaining or extracting the second deciduous molars when they have no permanent successors. I would welcome a report on other investigations of this problem.

Fig. 18. This case is similar to one which I treated before having an x-ray machine in my office. The case appeared very simple and had nothing



Fig. 16.

but a marked separation between the central incisors with an enlarged frenum. A simple appliance was placed on the teeth and the central incisors brought together. At the proper time, the frenum was surgically removed and a retaining appliance inserted. At the end of what I considered sufficient time for proper retention, the bands were removed and in about two or three weeks, the teeth began to separate again. I again brought the teeth together, and held them in their position for a longer retentive period. Again I removed the bands and again the teeth separated. It was now that I decided to take a radiogram and the condition shown you in Fig. 19 will reveal a facsimile of my experience.

Fig. 19. No serious harm had been done, yet it was most embarrassing to me to explain the circumstances to the parents of the child. The child had been placed under unnecessary treatment over a period of years and entirely

due to my ignorance. Supernumerary teeth, as you know, are not at all uncommon; they may appear in almost any part of the dental arches.

Fig. 20 shows a patient who had thirty-six well-defined teeth. The illustration shows a maxillary and mandibular fourth molar on one side and the condition was exactly the same on the other side.

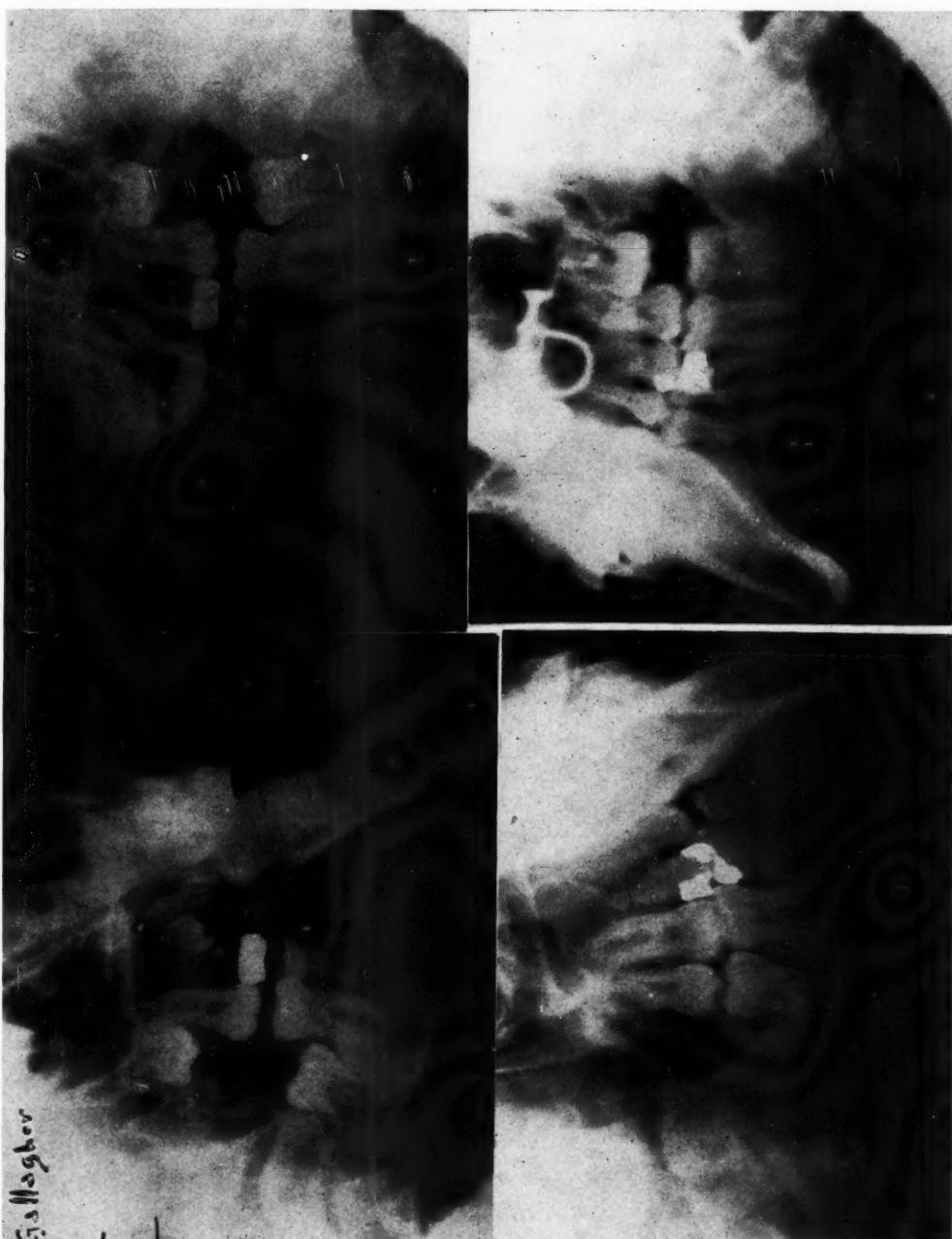


Fig. 17.

Fig. 21. A few illustrations to show some of the unexpected findings in mouths that appeared perfectly normal clinically. The upper radiogram shows a slight tipping of the mandibular second premolar. The lower radiogram, a progressive picture, about two years after the upper one, shows the continuation of the growth in the malposition of the premolar.

Fig. 22. We have here, misplaced premolars in adult life. This condition could have been avoided if preventive orthodontics had been rendered at the proper age.

Fig. 23. The matter of deflected permanent tooth buds is sometimes quite explainable. Here you will see the presence of two unerupted maxillary central incisors. Clinically, the left maxillary central incisor has appeared through the gum, but the right maxillary central incisor is in position. From the history obtained, I learned that through an accident in early life, the right maxillary deciduous incisor was forced into the gum, but later came down itself without any dental interference. However, clinically, the de-

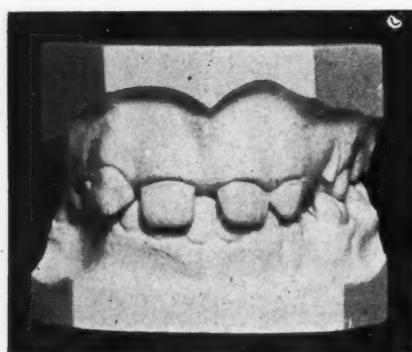


Fig. 18.



Fig. 19.



Fig. 20.

ciduous tooth was devitalized and as you can see from the slide, practically no absorption had taken place. I believe these early accidents causing deciduous teeth to be forced into the process, oftentimes deflect the permanent successors.

Fig. 24. This picture shows the right maxillary permanent central incisor has now erupted, but it is quite rotated and further orthodontic treatment will be required. The question of the normal absorption of devitalized deciduous teeth is a problem for real research and I hope some one will carry it along. I have considerable data for any one wishing some assistance along this line.

Fig. 25. We have here the failure of the eruption of the maxillary central incisor and again the presence of a devitalized deciduous central incisor with history of early trauma.

Fig. 26. While dealing with the question of devitalized teeth, I wish to



Fig. 21.

show you one of the most important lessons that I have ever had in my practice in regard to having taken radiograms before starting, and not only making a record of them in my personal records, but also in notifying the general dentist who cared for the child. You will notice the left-hand radiogram

shows a lateral incisor incompletely formed and a broken-down central incisor. The case was one where the jaw relations were excellent, but the four maxillary anterior teeth were in lingual occlusion and gave a very unsightly appearance to the child. If I were to treat the case over again my procedure might be different, but that is beside the point which I desire to bring out.

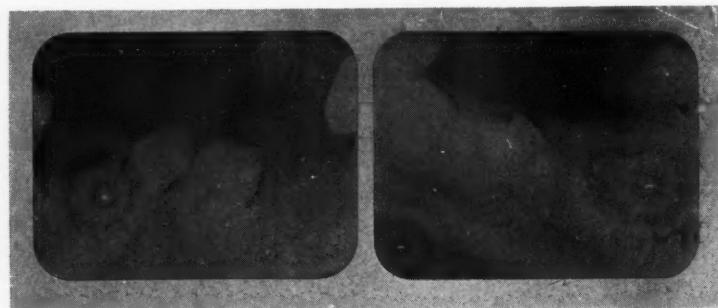


Fig. 22.

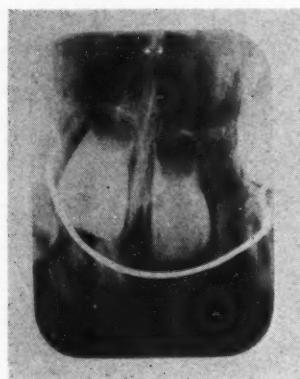


Fig. 23.

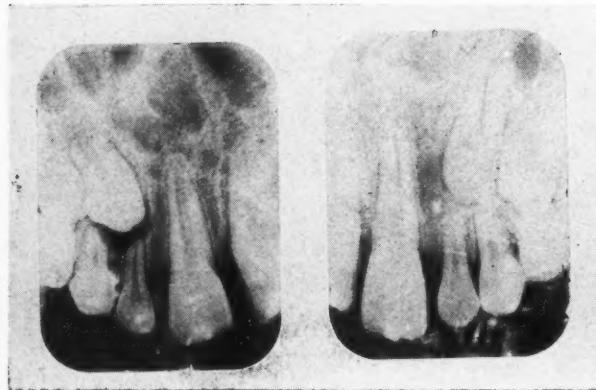


Fig. 24.

The radiogram shows the lateral incisor root incompletely developed, yet the radiogram of the left lateral incisor which I took for comparison, showed the tooth fully developed. There was no clinical evidence of pathology and so with the conditions noted on my records, and that of the dentist, I went ahead. After completing the simple case and removing all retainers and

having the superior central incisor repaired, the general appearance of the anterior section of the mouth was quite good, but a little later, a sinus developed above the lateral incisor region and the radiogram at the right shows the cause of this, a typical alveolar abscess. If I had no radiogram before starting orthodontic treatment, many questionable statements might have

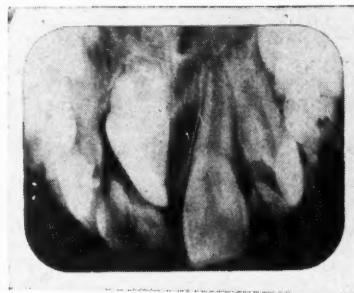


Fig. 25.

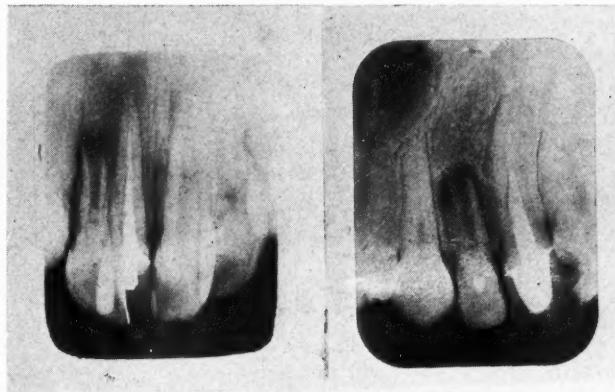


Fig. 26.



Fig. 27.

arisen. This case in itself should be a sufficient lesson for most of us. For our own protection, we should radiograph all cases before and after treatment.

Fig. 27 shows a condition which was disclosed to me while radiographing a child at his preliminary examination as to the advisability of orthodontic treatment. Does the early loss of the deciduous teeth cause extended damage in the adjoining area? Here you see the early loss of the maxillary second deciduous molar; the first molar has drifted forward, causing pressure on the

second premolar, that, in turn, on the first premolar, and I believe it is safe to say caused some undue pressure on the canine tooth. The question of certain migrations of the first molars due to the early loss of the second deciduous molar is of real importance; for many times the developing roots become markedly curved during the forward migration (due to development), and this may be an important factor in explaining the difficulty encountered in trying to move the teeth distally at a later period.

Fig. 28. The mandible of a very young pig. Note that in this picture, the second permanent molar, that corresponds to our second molar is just erupting. You see no evidence of any third molar.

Fig. 29. The radiogram of this pig, shows the crown of a third molar deeply tucked away in the ascending ramus, awaiting the forward development of the mandible. I have evidences in my collection of impactions of third and fourth molars in animals, but I can hardly believe that this tooth



Fig. 28.

can be considered anything but in a normal position. I have verified this in many, many radiograms of animals at this age. *Kindly note the occlusal surface and note its relation to the free border of the mandible.* Will you kindly recall the very first illustration which I showed of the child at six years of age when I pointed out the parallel relation between the occlusal surface of the molar and the free border of the mandible? This, I believe, is a point worth investigating for it may aid us in determining whether a tooth might be considered in a malposition or in a normal position.

Fig. 30 shows the condition in a human which will do for comparison with the animal skull. You will note the relation of the erupting second molar which has now just about appeared above the gum and note carefully the unerupted wisdom tooth. You will see that it appears in a tipped position, very similar to that of the pig and very similar to the inclination of the second molar in my first slide of the skull. Now, note the important factor that the *occlusal surface is again parallel to the free border of the*

mandible. The inclination of the tipping varies considerably. I will show you just a few radiograms of the mouths of normal appearing children.

In Fig. 31 we have a picture of a child at the age of nine and one-half years. You will note the relation or position of the unerupted and just developing third molars. Note the mandibular third molar, its tipped appearance, and again note the *parallel relation of the occlusal surface to the border*

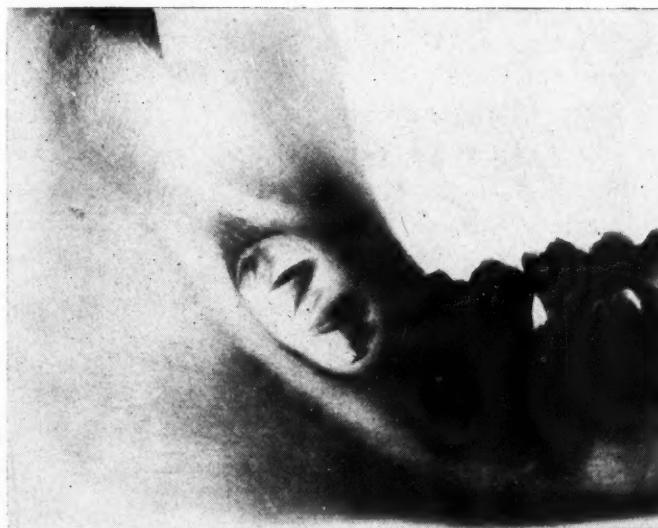


Fig. 29.



Fig. 30.

of the mandible. Now note the extreme position of the superior wisdom tooth. I have under observation now, some fifty cases which, from further reports, in a few years will accurately determine whether or not these teeth have a normal eruption. However, I shall just show you a few cases today in series form.

Fig. 32. The upper radiogram was taken at the age of eleven before any treatment had been rendered and the child's mandible appeared clinically well developed. Note the extreme tipping of the mandibular third molars. It is from this picture that I wish to emphasize the importance of being familiar with the anatomy of the part at the time and age radiographed. The lower radiogram shows the same child three years later. The change in the position of the third molar by the normal development of the mandible is quite apparent. I believe a deeper study of this third molar problem might aid us in that most important question, "Do third molars cause irregularities in the anterior region by pressure or any other means?" Now, in checking up on this subject of whether the erupting third molars really may cause irregularities in the anterior region, I will show you a few illustrations from cases in my practice with a brief description.

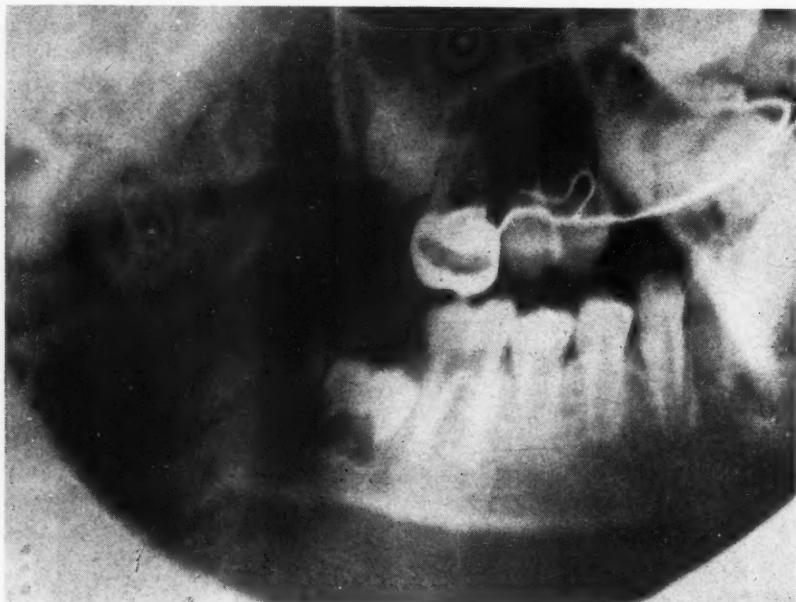


Fig. 31.

Fig. 33. This little girl's anterior teeth, six years after all retainers had been removed and the teeth at that time were in a most satisfactory position, began to crowd in the mandibular anterior region. The radiogram, taken just last month, shows a badly tipped third molar. I have at this time no absolutely definite proof that this third molar has been the cause of the crowding in the anterior region, but on general principles and for no better explanation of the crowding, I shall have the tooth removed surgically.

Fig. 34. A premaxillary lateral incisor beginning to protrude several years after orthodontic treatment had been satisfactorily completed and with no apparent cause. The radiogram shows an unerupted third molar causing pressure against the second molar. Although I have no evidence that this is the cause, yet as per explanation of the previous case, I shall advise the re-

moval of the third molar. You will note that in these cases, the roots of the second permanent molars are as a rule close together, denoting, I believe, pressure.

Fig. 35. There is one phase of the work in radiographing which must not be overlooked. That is the possibility of errors, on our part, in the angulation

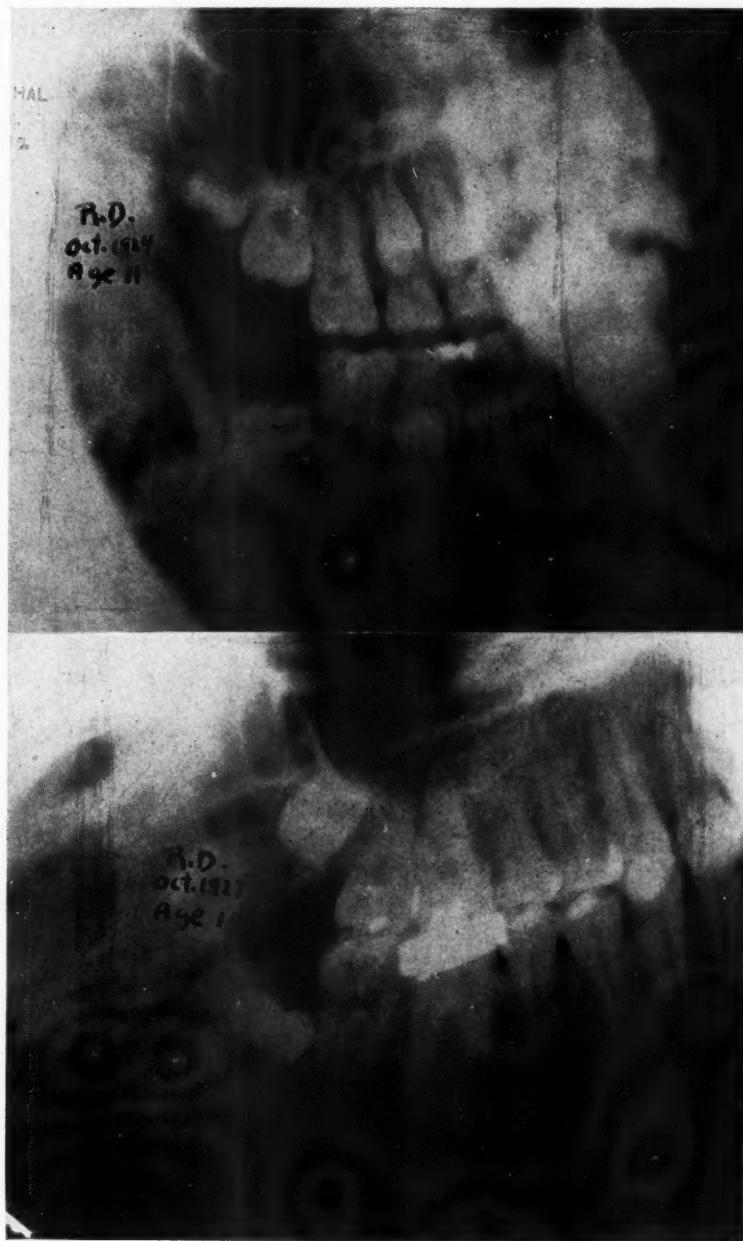


Fig. 32.

—especially, in series work, where a picture taken at one angle shows one thing, and taken at another angle, may show another. Yet, I wish to show you that this illustration which was taken as accurately as I could take it with my angulations recorded, shows the condition here presented. I do not

offer any explanation other than calling it to your attention for consideration. Notice in the upper radiogram, the patient is eighteen years old. She came in to see me because her mandibular anterior teeth were beginning to crowd. At once radiograms disclosed this partially impacted third molar. I suggested the removal of the tooth, but upon her return to me again in 1925, two years later, the lower radiogram disclosed the condition as found. The anterior teeth at this time were more crowded, but just why and how the third



Fig. 33.

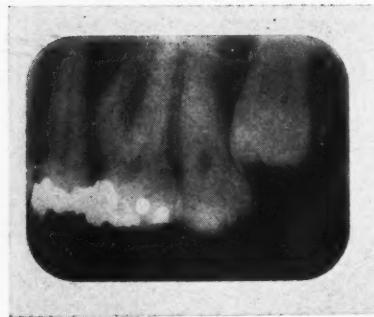


Fig. 34.

molar assumed the position as here shown, I cannot explain, even though I consider the possible variation in angulation.

Fig. 36. One of the most important reasons why you should radiograph cases before inserting appliances is for the prevalence of unexpected and unseen cavities. The embarrassment of removing bands after orthodontic procedure and finding a cavity beneath it has, unquestionably, been felt by many of us; and yet you see, in this slide of the central and lateral incisors, we have two small, but well-defined cavities in the approximal surfaces. The teeth were overlapping and the cavities were not seen by clinical examination. The danger of having inserted bands over these cavities needs no explanation.

Fig. 37. The mouth of an adult who had no apparent trouble with his teeth for years. Upon radiographic examination, the maxillary first premolar disclosed an unseen cavity which, upon excavation, necessitated an exposure and the removal of the nerve. I show you this only to give you a general idea as to the importance of radiograms from the standpoint of determining cavities.

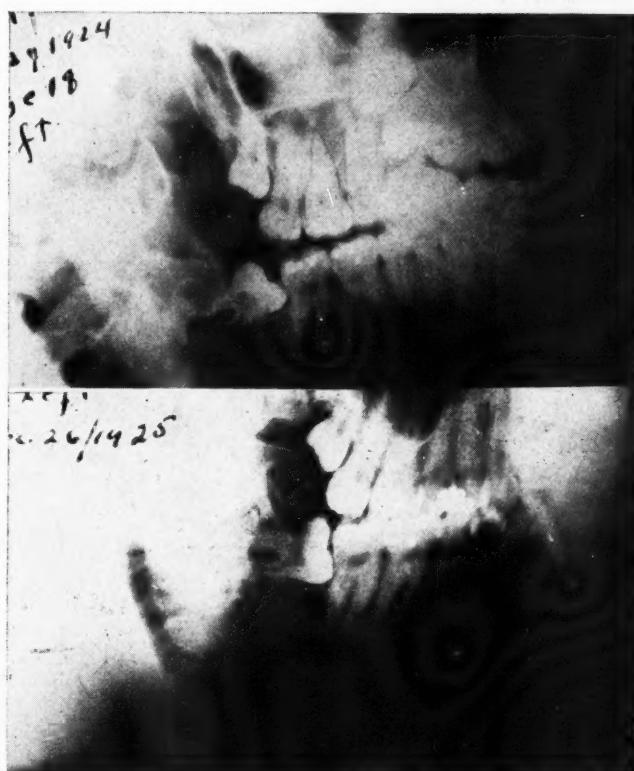


Fig. 35.



Fig. 36.

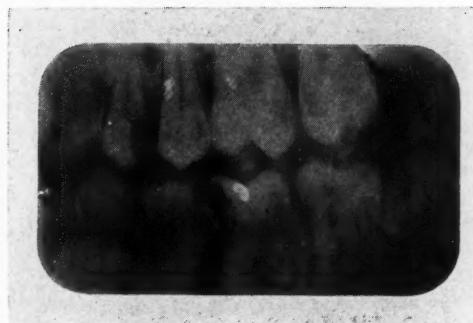


Fig. 37.

Fig. 38. The upper radiogram shows the position of the teeth before inserting the appliances. You will note that the second molar has apparently a normal position in the mandible. The second radiogram shows the result of the faulty application of my orthodontic appliance. I have, unquestionably, applied undue strain distally, causing the tipping of the first molar and with

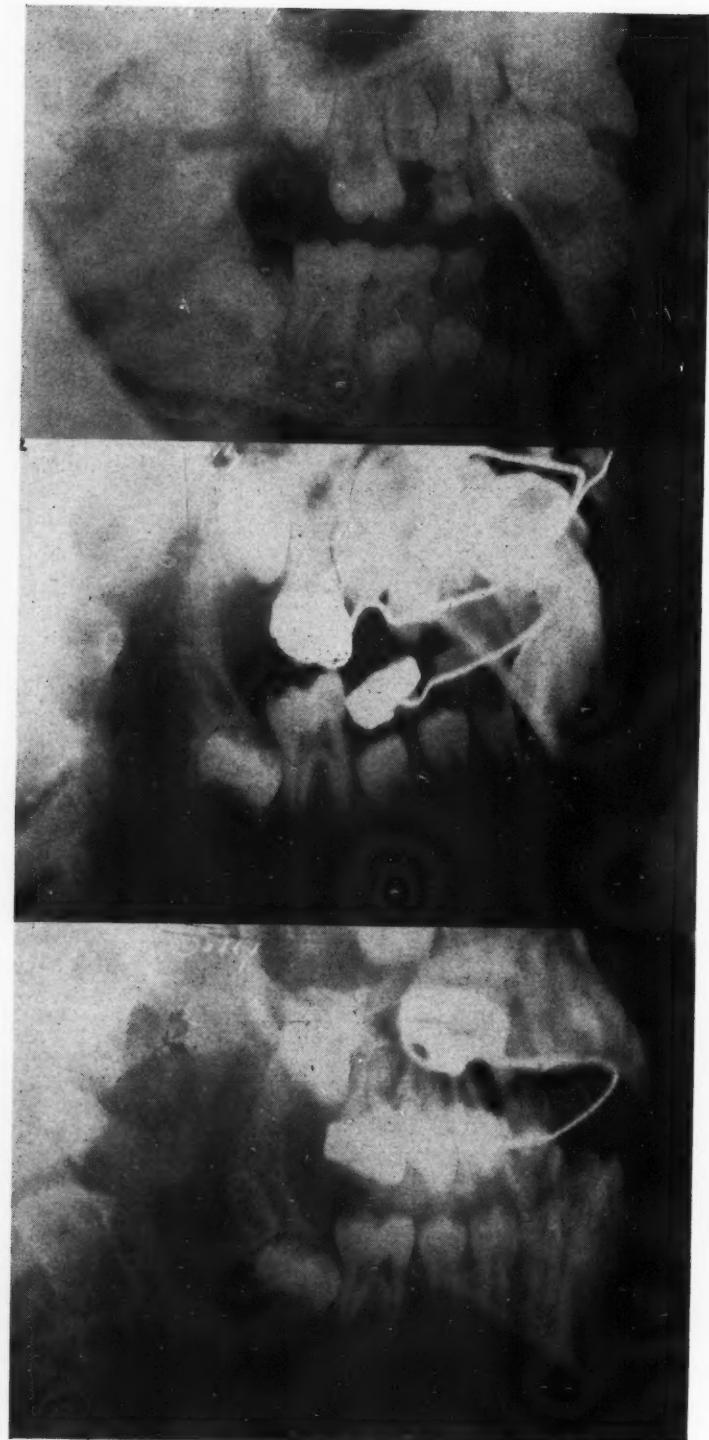


Fig. 38.

that a slight impaction of the second molar. That, unquestionably, has caused a disturbance in the third molar region. Fortunately for me, the radiogram was made during active treatment and the appliance was removed in sufficient time to allow nature to correct the starting of a deformity which might in .

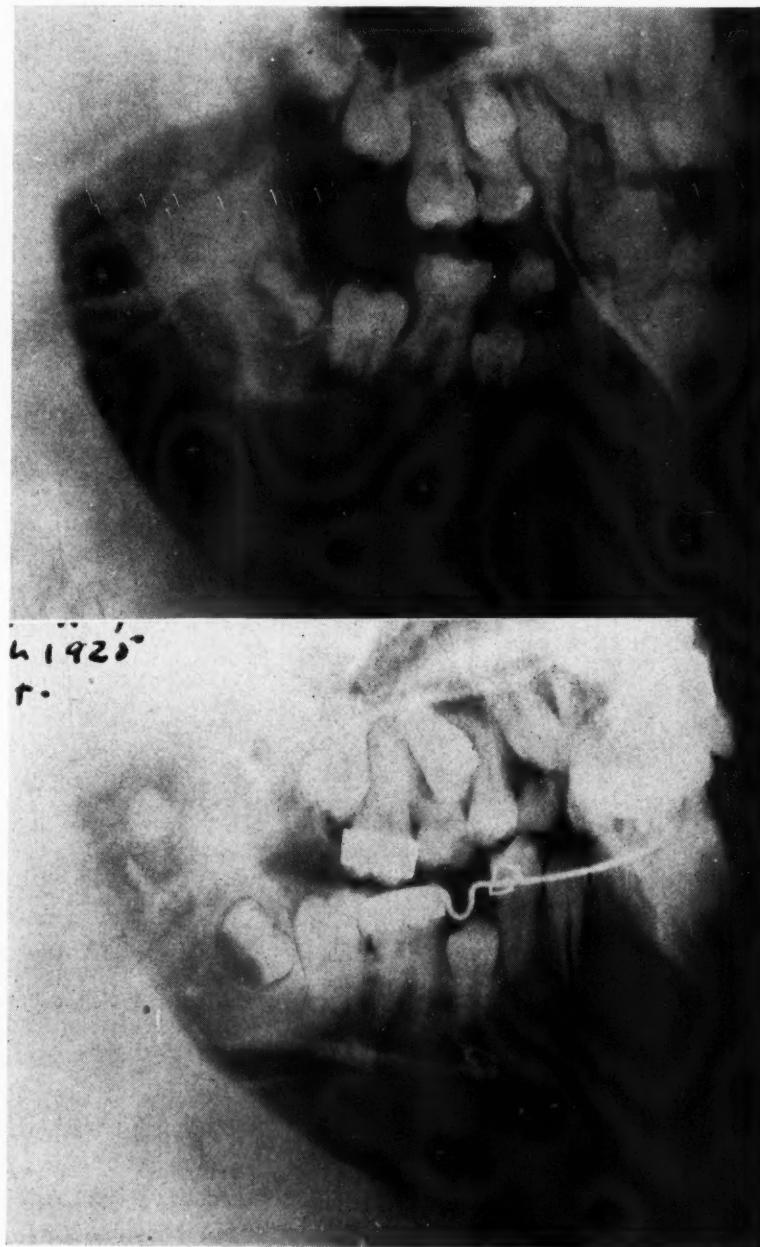


Fig. 39.

later life have become more serious. In the lower picture you will note nature's successful attempt in replacing the teeth in their normal positions.

Fig. 39. The upper radiogram shows the condition before inserting any appliance. The lower radiogram shows the tipping (distally) of the first molar and the second molar and the impacting of the third molar.

Fig. 40. A radiogram disclosing faulty and useless orthodontic treatment. A very simple case of separated maxillary central incisors. As shown, a simple pin and tube appliance was inserted and the crowns of the teeth were apparently brought together in a simple way. Nothing has been accomplished in so far as root movement. Nothing in so far as a permanent and satisfactory result. The radiogram shows beautifully just how much work is expected of the osteoclasts in our tooth movement.

Figs. 41 to 46. Case of C. H., my final case report, carrying out all the significance of my title. You see here the casts of a girl, aged fourteen, with a perfect formation of all her teeth, beautifully shaped arches, but with the absence of the left maxillary canine tooth. She called at my office at the request of a dentist who had just noticed that the left premaxillary lateral incisor was very loose. It was for this reason that the child was sent to me. The lateral incisor was so loose that the child could move it around at will with the slightest pressure of her tongue. The mother called at my office only because she was afraid this tooth might drop out.

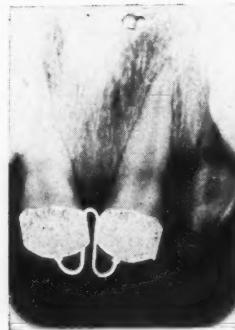


Fig. 40.

Fig. 42. The first radiogram in the upper left-hand corner will show you the cause of this loose lateral incisor. The radiogram was taken before active orthodontic treatment was started. Had this radiogram been taken some five or six years earlier, it would have unquestionably prevented this horrible, serious, and perhaps uncorrectable damage. You will note the unerupted and malposed canine tooth. You will note that it has absorbed practically the entire root of the lateral incisor and lies in a cross position on the root. After a thorough explanation to the parents, the case was taken on with the distinct understanding that there was no assurance of a permanent result; that is, in so far as the lateral incisor was concerned. In February, 1924, the case was started. The next radiogram shows the condition in March, 1924, after the appliance was inserted. A specially shaped auxiliary spring which, so far as I know, is original, to me at any rate, was inserted. I shall not dwell on the principle of this spring at this time, but would say that I have successfully treated some twelve or fifteen cases with it and without cementing any band or hook in the crown of the tooth. The next radiogram shows the condition in April and the next one in May. You see that the tooth has now begun to move and as it becomes more upright, it is relieving the pressure on the

lateral incisor. Even at this time, three months after treatment, the lateral incisor has begun to tighten up. For my own personal interest, radiograms were taken every month during the treatment of the case, but I shall not show them all.

Fig. 43 shows the condition during September, 1924, October, December and February, 1925, one year after treatment was started. Note now, the condition of the lateral incisor. From the radiogram no man would believe that this tooth was firm. Why it is firm, I cannot tell you. The patient was



Fig. 41.



Fig. 42.

examined at this time by several orthodontists in Boston to whom I reported the case and who I believe will verify that the tooth is quite firm. The question as to whether or not new development or regeneration of the tooth root will follow is to be observed.

Fig. 44 shows the condition in September, 1925, with a retainer in place; the next film shows the condition after all retainers had been removed and in February, 1926, two years after the case was started. The next film September, 1926, one year after the radiogram above and the next one in February, 1927, three years after the case was started.

Fig. 45 shows the case as started, and as I saw the patient two months ago, September, 1927. Clinically the tooth is vital. It is absolutely firm and the patient masticates well on it without hesitation. I cannot explain to you why or how long this tooth will remain in position. I have had histologists in Boston thoroughly examine the condition and they have no complete or positive explanation for it. You will note, however, that there is a consider-

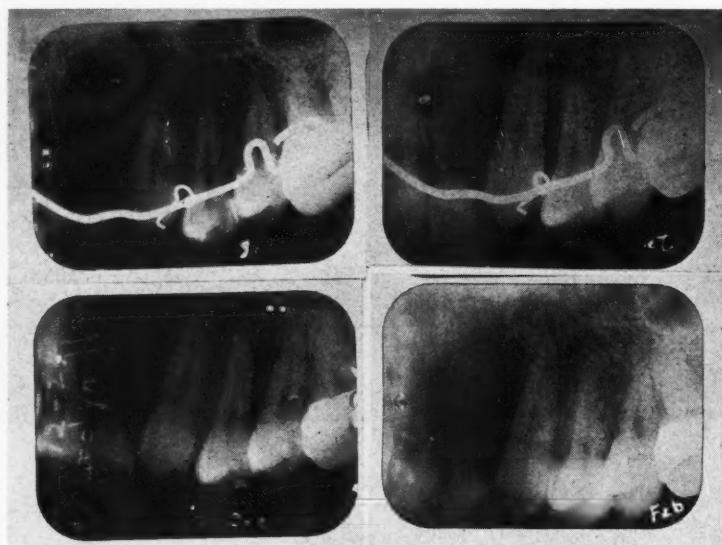


Fig. 43.



Fig. 44.

able amount of new bone growth above the lateral incisor root and upon very close examination of some of my radiograms of this area, you can see what appears to be normal bone formation directly into the canal of the tooth. The patient is under observation every three months and if the tooth should fall out, it will be sent immediately to the laboratory for a thorough and scientific study.

Fig. 46 shows the condition of the patient in September, 1927, at the time the last radiogram was taken, a period going on four years after the case was started.

In conclusion, I have tried to show you:

1. Radiograms should be taken before any orthodontic treatment is started, regardless of clinical findings.
2. Periodic radiograms should be taken to show just what our appliances are doing.
3. Radiograms should be taken after treatment to check up conditions which may have developed since treatment was started.

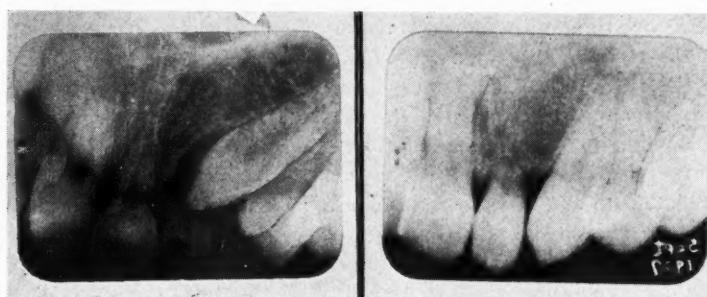


Fig. 45.

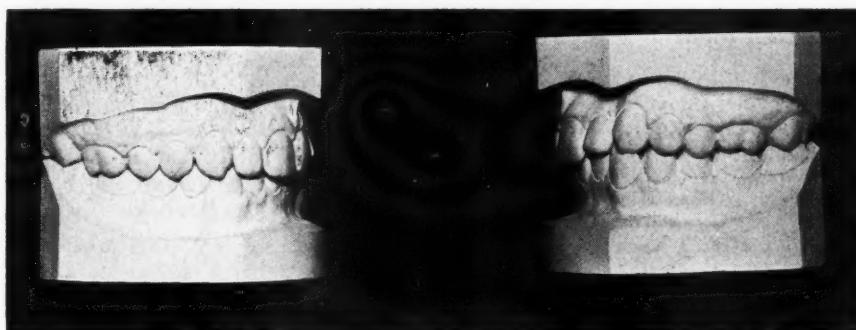


Fig. 46.

DISCUSSION

Dr. Charles F. Bödecker.—The presentation of Dr. Blumenthal is excellent inasmuch as it contains many practical points frequently encountered by the orthodontist. The essayist is not dogmatic in any of his statements and wherever he does express an opinion, it is based on sound radiographic proof.

There can be no doubt in the minds of any who have heard this presentation, that Dr. Blumenthal has carried his point as to the value of periodic radiographic examinations. I was also gratified to hear that the essayist emphasizes the importance of the correct angulation of the tube in repeating future radiograms, but I need not go into that matter, for we all know that the value of an x-ray is in direct proportion to the ability of the operator to reproduce the exact conditions under which previous radiograms were taken.

There are several points in this paper which interest me as a histologist. One is the variation in the time of calcification of the tooth germs in different individuals as shown in Figs. 2 and 3. We know that the period of eruption of the teeth varies in different patients, but we were not certain that this might be caused by a variation in the begin-

ning of calcification. There is, however, another factor which has a strong influence upon the variation of the time of the eruption of the teeth which will be discussed at another time.

The x-ray has brought valuable data to the embryologist in relation to the manner in which the teeth are formed. Dr. Beust of the University of Kentucky at Louisville read an interesting paper at the meeting of the American Dental Association in Detroit (1927) on this topic. We have previously thought that in the development of a premolar, for instance, the two islands of calcification which form the tooth, are at first very closely approximated and move only as growth proceeds, to be finally united when they have reached their proper relationship to the future tooth. Dr. Beust, by the aid of the x-ray has shown that this is not the case; he finds that the various islands of calcification are developed far apart, in the position which they will definitely occupy in the future tooth.

In Fig. 15, the essayist shows the complete absence of all deciduous and permanent tooth germs in the mandible, a very interesting but lamentable condition. It proves to us, the immensity of our ignorance concerning some conditions affecting the inception and development of the teeth. At some future meeting of this Society, I hope to speak about a revolutionary theory advanced by Robinson concerning the part played by the epithelial structures of the periodental membrane in the eruption and retention of the teeth.

I would also like to sound a note of warning or encouragement, as the future will tell, concerning the actinic effect of the x-ray on vital tissues. Your worthy president, Dr. Waugh, suggested this to me. There is no doubt that the roentgen ray in overdosage may cause serious, almost incurable burns, but the effect of a minimal amount appears to stimulate activity in certain cells. Robinson describes a beneficial effect to the therapeutic use of the x-ray in stimulating a tardy eruption of the teeth.

Our difficulty, however, is to ascertain the proper dosage. All operators should consequently keep the irritating property of the x-ray in mind and not subject patients to extreme dosages. Personally, I have used the roentgen rays therapeutically since 1912 with good effect on all forms of chronic pain such as pulpitis and periodontitis.

Another point brought out by the essayist and one which has caused me considerable thought for the last year, is the irregularities in the absorption of pulpless deciduous teeth. Dr. Ed. Sullivan of Boston called my attention to this problem and he is doing some work in this connection in my laboratory at the Columbia University Dental School. If Dr. Blumenthal will confer with Dr. Sullivan, I am certain that they will bring out points of mutual interest and of benefit to the dental profession in general.

The final matter I wish to discuss is the case concerning the absorption of the root of the permanent lateral incisor as shown in the last series of Figs. 41 to 46. It seems doubtful whether it is possible to form again a once resorbed root, even though the pulp may be in a normal condition. Even if we grant the ability of the pulp to be able to do this, the surrounding bone would first have to be absorbed in order to make room for the new growth of root. The essayist's statement that the lateral incisor appears quite firm and that the patient can safely subject the tooth to normal mastication is not very surprising, considering how little retention a tooth really requires if the periodental membrane and the surrounding bone are in a healthy condition.

In closing, I for my part, wish to thank Dr. Blumenthal for his essay as well as to express my appreciation of the keen analytical spirit with which he has collected his material.

Dr. Marlin Dewey.—I wish to compliment Dr. Blumenthal on the wonderful presentation he has made of this subject. I agree with everything he has said regarding the value of periodic radiographic examinations. As the hour is growing late, I will only mention a few of the various subjects which he has brought up for consideration.

He has raised the question as to the absorption of pulpless deciduous teeth during orthodontic treatment. It has been my observation, both clinical and radiographic, that pulpless deciduous teeth absorb as readily as do teeth which have a pulp, providing the surrounding tissue is in healthy condition. While some investigators believe that the pulp assists in the absorption of teeth, I have never seen any histologic slides or radiographic evidences that would lead me to believe that pulp plays an important part in root absorption. In fact, I doubt whether the periodental membrane as a periodental membrane, plays

any part in root absorption as we find histologic slides which show root absorption to be going on in regions where the periodontal membrane is not attached to the tooth. In fact, if the osteoclasts and round cells are active in a particular region, the entire picture of tooth attachment is changed.

Root absorption does not begin in any one particular region of the root but is very similar to bone development in that it proceeds by periods of activity and rest.

Dr. Blumenthal also showed a slide in which the deciduous teeth of the mandible were attacked by caries and absorption without having had any appliance placed. This brings up the question as to whether the use of deciduous molars as anchor teeth causes a premature absorption of the roots. In some instances deciduous teeth used as anchor teeth seemingly absorb early, but in the majority, if not in all those cases, the permanent teeth also develop early. To my mind the entire question of root absorption is one in which the constitution of the individual plays a greater part than does the question of pulp vitality or orthodontic anchorage.

Dr. Blumenthal's suggestion that third molars develop in seemingly impacted positions is well worth considering. I have long contended that many so-called impacted third molars were normal for that age and if the individual developed normally the teeth would assume the proper position in the dental arch.

I want to call your attention to a paper presented several years ago by Dr. Clarence O. Simpson, in which he showed the possibility of radiographic examination as an aid to appliance construction and design. By using a No. 2 film it is possible to get a view which shows the entire arch and also the appliance in position. Such a radiogram not only shows the malposition of the individual teeth on two planes but also shows the position of the appliance. Any particular appliance design can be very carefully recorded and radiograms can be made at various intervals showing the amount of tooth movement accomplished during certain periods of time.

In reference to the lateral incisor whose root was absorbed by an impacted canine, I believe that that tooth will remain useful as long as any tooth in the mouth providing it does not suffer some other injury or accident. It simply proves the small amount of root necessary to retain a tooth in functional position. The above fact is not surprising when you remember that many teeth with roots much shorter than found in man, are functional during the lifetime of animals.

Dr. Abram Hoffman.—I want to compliment Dr. Blumenthal upon the excellence of his presentation. It seems to me that I have treated more cases wherein I have seen short teeth than any other man living. I have had my share of them, I know, and it early stimulated my interest in this work.

Dr. Blumenthal spoke of the case with just the two spike teeth, and for his and Dr. Bödecker's information I want to say that if my memory serves me correctly, if you will look in the March, 1882, issue of the *Dental Cosmos*, you will find an article by the late S. H. Guilford, wherein he reports a man whose name, again if my memory serves me, was Shumaker, who lived in the coal regions of Pennsylvania and attained middle life and was entirely devoid of teeth, deciduous and permanent. Of course, in those days there were no x-rays with which to check up, but the case as Dr. Guilford reported it seems to be quite clear and it may be of interest to you men who are following along that line.

I had a case, too, in my own practice some few years ago wherein there were just eight teeth in the head. That case was radiographed. The boy at that time was, I believe, sixteen years old.

These cases are intensely interesting, and more recently my personal interest has been stimulated by the work of some of our own members in the American Society. A symposium on the treatment to give in these cases will be recalled by Dr. Young, because he took part in it; I do not remember whether Dr. Kelsey did or not, but Dr. Ketcham did. That stimulated me because I wondered whether I should close or open spaces, or hold spaces, or what-not.

Dr. Blumenthal spoke of the deciduous molars that sank out of sight, there being no premolars following. It has been my experience that those teeth just virtually sink down, down, down and out of sight because of the forces of occlusion and the force of approximal contact.

President Waugh.—Is there further discussion?

Dr. Neustadt.—I should like to ask Dr. Blumenthal whether he believes that the root of the lateral incisor which was resorbed by the canine has grown during the time of treatment? I could not make it out very clearly because of the rapid succession of the lantern slides, but I believe it fully possible that new cementum can be deposited on the end of this root, though it was very much absorbed, and this, together with the development of periodental fibers, would make a very firm attachment of the bone.

President Waugh.—As to Dr. Neustadt's question, in explanation of those conditions in the jaws where we seem to have a great deal of the osseous structure destroyed around root ends in earlier radiograms when the pathologic condition is quite active, a little bit later one sees cancellous structure in a large area, an area that would cover a diameter of three-quarters of an inch. Personally, I have never felt that entirely new bone was formed in that area. I have felt in the calcific, the inorganic part of the bone, approximately two-thirds of that bony area had been so much resorbed temporarily that the shadow was not registered, but that the organic matrix, the one-third, was still present and vital and not destroyed, and that when the pathologic irritant was removed, recalcification of more or less the original organic matrix in that area occurred. Histologically, the presence of third molars can be shown at three years to six months of age. Dr. Blumenthal reported a case to us at eighteen years of age. So there is a great latitude in the period in which calcification is sufficiently dense to show it, and in the case of that lateral incisor I believe that the thirty-two per cent of organic matrix of the cementum of that root and the approximately twenty-eight per cent of organic matrix of the dentin had remained, even though the lime salt had not been sufficiently absorbed not to throw a shadow, and that the original organic matrix had been recalcified sufficiently to make it appear as though we were growing roots. That is the explanation, Dr. Neustadt, and it seems to me that would perhaps help to explain that appearance of seeming to grow a new root.

Is there any further discussion? If not, we shall call upon Dr. Blumenthal to close the discussion.

Dr. Fred R. Blumenthal.—In reply to Dr. Neustadt, the President has helped me out far better than I could possibly have explained or answered it. So far as any new root having been regenerated, I am not prepared to say on account of three years only having elapsed.

I want to thank Dr. Bödecker and Dr. Dewey for their kindly formal discussion of this paper, and Dr. Hoffman and others for their data which they have collected in dates before I was born, and which I shall look up.

In closing, I wish to state now definitely that if the slightest bit of scientific data has been gained from my preliminary studies, I wish to give credit for it to Dr. Lawrence W. Baker and to Dr. J. Lowe Young for having given me the inspiration to begin this investigation. I thank you.

ABSTRACT OF CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA
DENTAL RADIOGRAPHY
BY DR. EDWARD PREBLE, New York City

NUTRITION AND PEDIATRICS
BY DR. SAMUEL ADAMS COHEN, New York City

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Orthodontia, Oral Surgery and Radiography

Fever in Dental Practice. Editorial in the Pacific Dental Gazette, August, 1928, xxxvi, 8.

The editor comments on an editorial on this subject which appeared originally in the British Medical Journal and was reproduced in the Dental Surgeon. The paper which originally called forth the editorial comment was by Dr. Leonard Mackey on the subject of pyrexia and the statement was made that the dentist is but little interested in the use of the thermometer in his routine office work. The editor of the Gazette agrees with this statement although one would imagine that with the present wide vogue of focal infection the dentist would in certain cases at least make use of thermometry. Those who do resort to it often obtain valuable information. Dr. Mackey suggested that in certain cases like acute and chronic abscess of dental origin the thermometer be always used. Conversely whenever there is unexplained continuous rise of temperature in ordinary medical practice the dentist and dental radiologist should be invoked. Even in edentulous patients this precaution should be taken for there may be an infected root concealed by the mucosa of the gum. Cases are cited in which a prolonged continued fever of mysterious nature resulted in a diagnosis of unsuspected abscess of a tooth or root. In addition to ordinary abscess apical infection may also give rise to fever. In certain cases the presence of slight rise of temperature has decided the question of extraction in the affirmative. In such cases the x-ray has shown radiolucent areas or chronic proliferative pericementitis without bone lesion beyond the lamina dura.

What Teeth Should Be Extracted? W. H. G. Logan (Chicago). The Dental Digest, July, 1928, xxxiv, 7.

The author sums up numerous categories of teeth which apparently should come out, even in the opinion of some during periods of quiescence. Un-

erupted teeth which never can erupt are often extracted on general principles although the author would not meddle here as the dangers of infection are greatly exaggerated. When there is mechanical hindrance to eruption he would not extract unless the pulp is affected. If an unerupted tooth which is not otherwise a menace appears to cause neuralgia, etc., he would extract only as a last resort. In the preceding categories it is assumed that the teeth are embedded in normal tissues. But if the tissues are the seat of a pathologic alteration then extraction should be done and this applies alike to embedded root fragments. In regard to teeth with putrescent or infected pulps or nonseptic pulpitis the author would for the most part, if the periodontal membrane is intact, endeavor to save them; but if the membrane in question is not intact they should be extracted on general principles. Teeth affected by pyorrhea should be treated conservatively if only the gingival third is involved and even the middle third, although then the chances are against success. Only in teeth with the apical third involved should extraction be done forthwith. If the teeth are involved with dento-alveolar abscess there is no absolute rule—extraction may be necessary for drainage but extraction of some of these teeth may be a source of danger unless milder measures are first used. In infected partially erupted third molars the author also advocates conservative measures at first and in certain cases extraction is also contraindicated.

Nutrition and Pediatrics

Survey of the Communicable Disease Situation in Chicago. J. R. Gerstley, J. C. Geiger, I. S. Falk, I. A. Abt, C. J. Grulée, and J. F. Norton. *Am. Jour. Dis. Child.*, 35:6, June, 1928.

In a comprehensive report which covers the years 1925, 1926 and, in a measure, 1927, a special committee appointed by the Institute of Medicine of Chicago to make a survey of the communicable disease situation in that city, through its chairman, Jesse R. Gerstley, makes some very interesting observations.

The figures for the incidence of tuberculosis and pneumonia were particularly high in the wards with large negro population. Moreover, the death rates for tuberculosis and pneumonia are from three to four times as high among negroes of Chicago as among the whites.

For statistical purposes, reports of communicable diseases during the years from 1911 to 1926 were analyzed. In regard to pneumonia (all forms), there has been a rising trend in the number of cases from 1912 to 1926, but from 1917 to 1926 the trend has been decreasing. In addition, there is also a decrease in the deaths from bronchitis combined with pneumonia (all forms). From 1918 to 1926, the trend in the number of cases and deaths from measles has been downward. The deaths are almost entirely from children under five years. Reported cases and deaths from chicken pox show rising trends. In regard to diphtheria and scarlet fever there is a steep decline in the number of both reported cases and deaths.

Other facts of interest are that typhoid fever has been almost entirely eliminated from Chicago's bills of morbidity and mortality and that there has been no death reported from German measles. The report also tells of Chicago's endeavors to reduce the incidence of communicable disease. With some diseases, particularly diphtheria, great success has been had with the prophylactic administration of diphtheria toxin-antitoxin. The following opinion is stated: "Since the introduction of vaccination against smallpox no form of active immunization against a communicable disease in the civil population has received such widespread acceptance by the public and such general endorsement of the medical profession as toxin-antitoxin immunization against diphtheria."

Concerning active immunization against measles, the committee feels that it is still wholly theoretical. It reports, however, the statistics of Park and Freeman who have obtained protection in from 85 to 90 per cent of susceptible persons exposed when serum was given before the fifth day after exposure to measles. The passive immunity conferred lasts only from two to four weeks and the susceptibility to measles is so universal that temporary immunity simply postpones the date of attack. In an attack of measles modified by the administration of serum a lasting immunity is secured.

More encouraging, however, is the committee's opinion of immunization against scarlet fever: "Active immunization against scarlet fever cannot yet be recommended as a general public measure, principally on account of the large number of injections required and the short duration of the immunity conferred." At present active immunization and prophylaxis against scarlet fever has its field of usefulness in institutions.

Scarlet Fever Antitoxin. R. Cannon Eley. *Am. Jour. Dis. Child.*, 35:1, January, 1928.

Eley reports on 465 cases of scarlet fever at the Willard Parker Hospital, New York, which were treated with scarlet fever antitoxin. He noted a distinct improvement in those patients within twenty-four to forty-eight hours after receiving the serum. Because there is a probability of an anaphylactic reaction accompanied by a serum rash which is often most distressing, the author does not advocate the administration of serum to those who have a mild or moderate attack of scarlet fever.

The Life History of Epidemic Encephalitis in the Child. Mary M. Stevenson. *Arch. Dis. Child.*, 3:14, April, 1928.

Reporting on 83 cases of epidemic encephalitis observed in the Royal Hospital for Sick Children, Glasgow, the writer presents some instructive data regarding this disease. In 71 of the 83 cases there was a history of a very acute onset. The fever, which was never high except in fatal cases, persisted usually for a week or two. The lethargy was present in 50 of the 83 cases and it varied in depth in different cases and at different times in the same individual. When the lethargy deepened into a coma and was accompanied by a rise in temperature, death always followed.

The choreiform restlessness, very characteristic during the epidemic of 1926, has some peculiarities. It is usually of a more extreme type than is observed in rheumatic chorea and shows in contrast to rheumatic chorea a tendency to increase at night. About one-third of the cases seen beyond the acute stages of the disease have shown some degree of parkinsonism and in some instances these unfortunate sequelae occurred two or three years later.

Children showing evidence of parkinsonism have a certain fixed attitude. When the child stands, it appears wooden, with the trunk bent forward and elbow flexed. When the lower limbs are affected, the gait is characteristic, the feet hardly leaving the ground when walking, and the steps are short. In every case there is a slowness of all movements.

Worthy of note to those interested in the oral cavity is the fact that the author noted that excessive salivation was present in all but two of the parkinsonian cases. These children are usually seen with the lower jaw hanging and saliva dribbling out of the mouth. Excess of saliva is present in all other types but in these it is usually associated with the act of spitting. One child has continued this habit for five years.

In this series and in other series reported ocular signs and symptoms featured the clinical records. Such disturbances as paralysis of accommodation, strabismus, ptosis, nystagmus, unequal pupils, are common. Over one-third of the cases showed changes in the fundi.

Paralysis was a frequent sequela and the most frequent paralysis seen after those of the eye was that of the seventh cranial nerve.

In 61 out of 83 cases seen in the later stages there was a history of nocturnal excitement coupled with the child's inability to fall asleep until 5 or 6 A.M. Sleep once begun would continue until the afternoon.

Special mention must be made of the disturbance of respiration which has been noted by all observers of epidemic encephalitis. Noisy breathing and periods of apnea may make their appearance from three months to three years after the onset of the illness. In the author's cases these respiratory disturbances were usually manifested by attacks of rapid and noisy breathing which sometimes appeared hourly and began without warning and with no apparent cause. Fortunately the respiratory abnormalities tend to disappear.

With only five exceptions the mental state of the children seen by Dr. Stevenson was much below the average standard for their ages. Moreover, their conduct and temperament in many instances changed for the worse. Violence, destructiveness, irritability, untruthfulness, and particularly bad temper were some of the many gradations of behavior.

In this series there was a 10 per cent mortality, all the deaths occurring within sixteen days of the illness. All the sequelae with the exception of the parkinsonian syndrome tend toward improvement.

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EDITORIALS

The Advisory Editorial Board

IN ORDER to increase the value of THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOPHGRAPHY to the profession and the represented specialties we have been working for some time toward the formation of an Advisory Editorial Board. It is the intention of those interested in the welfare of THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOPHGRAPHY eventually to make this an international board. We have endeavored to secure men whose standing in the orthodontic profession is recognized the world over and whose judgment on various subjects will be respected by the majority of the men in the profession.

The members of the Advisory Board have been selected with the hope that they will offer such suggestions as will be of value to the conduct and management of the journal, both from a scientific and from an editorial

standpoint. Each member of the Advisory Board will be allowed to express his individual opinion, editorially, without any restrictions whatsoever by the publishers or the editor-in-chief. Each editorial signed by a member of the Board will express the opinion of that individual member unless statement is made to the contrary.

THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOPHOTOGRAPHY has always endeavored to serve the interests of the profession above the personal motives of the individual. The journal has always endeavored to present both sides of a controversy in a free and unbiased manner. The scientific pages have always been open for the presentation of any subject, and this plan will be continued regardless of the views of the editor or of the members of the Advisory Board in reference to any controversy. It is our belief that the Advisory Board will make THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOPHOTOGRAPHY more representative of the profession. The intention of everyone, including the publishers, the Advisory Board, and the editor, is to render the greatest service to the greatest number.

The 1928 Meeting of the American Dental Association

THE work accomplished by the seventieth annual session of the American Dental Association compares well with any of the previous sessions.

Among the important business transacted was the adoption of a plan to redistrict the United States by creating thirteen districts instead of nine, each district to have a trustee. This change was deemed advisable because of the great increase in membership since the nine district plan was inaugurated. Two of the districts according to the nine district plan had over one-third of the entire membership of the American Dental Association. The thirteen district plan seemed a more equitable distribution according to membership and also fulfilled all of the Articles of the Certificate of Incorporation which states that the American Dental Association should be governed by thirteen trustees. As a result of redistricting, Illinois, New York, and Pennsylvania were made separate districts, each having a trustee.

Another important act of the House of Delegates was the adoption of a plan suggested by the President, Rosco Volland, creating a National Board of Dental Examiners. The question of creating a National Board has been discussed by the American Dental Association and other national bodies for several years but no workable plan was ever outlined. Dr. Banzhaf, in his address before the House of Delegates at Detroit, outlined a plan for the formation of the National Board of Dental Examiners and suggested an amendment to the Administrative by-laws creating a National Board, which was laid on the table, last year. Dr. Banzhaf's plan provided for the financing of the board from a source outside the American Dental Association. It developed that such a plan could not be perfected and, therefore, it became necessary for Dr. Volland to present a substitute plan and make a slight change in the proposed amendment to the administrative by-laws, which would create a National Board of Dental Examiners under the control of the American Dental Association. The National Board is composed of five men from the Ameri-

can Association of Dental Colleges, five men from the National Association of Dental Examiners, and five men from the American Dental Association who are not affiliated with any dental school or examining board.

In times past there has been no provision for the transfer of members of the American Dental Association from one State to another. The House of Delegates adopted a plan to provide for this transfer of members. To make this plan workable to the highest degree, a similar transfer must be provided by the different states to transfer from one district to another. The standing of life members of state societies as related to the American Dental Association has never been properly defined. An amendment was added to the administrative by-laws, setting forth the relations which life members of constituent societies occupy to the American Dental Association.

A standing resolution was adopted setting forth the plan of procedure when any member of the American Dental Association is accused of violating the code of ethics. This standing resolution provided for the proper means of notification and trial and also provided a plan whereby the member can appeal from the decision of the trial body if he thinks the decision has been biased or prejudiced.

The section of Orthodontia and Periodontia was divided and a section on Orthodontia and a section on Periodontia was created.

A resolution introduced at Detroit, making the dues of the American Dental Association \$3.00 instead of \$4.00 is laying on the table for action next year. It is believed that it will be possible to reduce the dues of the American Dental Association to \$3.00, thereby allowing each constituent an extra dollar for use by the constituent or component society.

Dr. Boyd Bogle, of Nashville, was elected President-elect.

Washington, D. C., was selected as the next place of meeting of the American Dental Association.

Orthodontic Notes

AT THE recent meeting of the American Dental Association held in Minneapolis the House of Delegates voted unanimously to form two new sections from the Section of Orthodontia and Periodontia: namely, Section on Orthodontia and Section on Periodontia.

This separation of these two sections is very sure to be beneficial not only to the two specialties but to the general profession. It will certainly be a stimulus to the members of the orthodontic specialty to provide unusually good programs which will prove of interest to the general practitioner.

The new Section of Orthodontia will function for the first time at the next annual meeting of the American Dental Association which will be held in Washington, probably the latter part of October. The officers of the new section are:

Chairman, Chas. R. Baker, Evanston, Ill.
Vice Chairman, Abram Hoffman, Buffalo, N. Y.
Secretary, Max E. Ernst, St. Paul, Minn.

It is to be hoped that all members of the orthodontic specialty and those members of the American Dental Association in general practice, particularly interested in orthodontia, will rally and make a most favorable show at their first session.

—W. C. F.

Erratum

In Vol. XIV, June issue, page 473, the author's name should be O. Rubbrecht.

ORTHODONTIC NEWS AND NOTES

Southwestern Society of Orthodontists

The Southwestern Society of Orthodontists will hold their annual meeting at Dallas, Texas, January 2, 3, 4 and 5, 1929. A cordial invitation is extended to all orthodontists and members of the dental and medical profession.—Paul G. Spencer, Secretary, Waco, Texas.

Southern Society of Orthodontists

The annual meeting of the Southern Society of Orthodontists will be held at Macon, Georgia, January 31, February 1 and 2, 1929. A cordial invitation is extended to members of the profession.—W. B. Childs, President, Macon, Georgia; Harry Holder, Secretary, Nashville, Tenn.

The Eastern Association of Graduates of the Angle School of Orthodontia

The meetings for the season of 1928-1929 will be held at the Vanderbilt Hotel, New York City, on Monday and Tuesday, January 28 and 29, 1929, and the annual meeting, which will be a get-together meeting of the Angle School Alumni, will be held on Monday and Tuesday, May 6 and 7, 1929.—E. Santley Butler, Secretary, 576 Fifth Avenue, New York City.

Dental Society of the State of New York

The Dental Society of the State of New York will hold its sixty-first annual meeting at Rochester, New York, on May 15, 16, and 17, 1929.

A cordial invitation is extended to all ethical dentists who are members of state societies to attend. The Society will also be pleased to extend a cordial welcome to all ethical Canadian dentists.

For information with reference to the exhibits, write to E. G. Link, 226 Cutler Building, Rochester, New York; Clinics, John T. McIntee, Chairman, Cutler Building, Rochester, New York; Literary Exercises, etc., A. P. Burkhardt, Secretary, 57 East Genesee Street, Auburn, New York.

Notes of Interest

Dr. W. Tyler Haynes announces the opening of his office for the exclusive practice of orthodontia at 413 Medical Arts Building, Richmond, Va.

Dr. Landis H. Wirt announces his return from Miami, Florida, to his former location, South Bend, Indiana, where he will re-engage in the practice of orthodontia exclusively at Suite 544 Associates Building.

Dr. S. H. Voyles and Dr. John S. Voyles announce the removal of their offices to Suite 925-933 University Club Building, Grand and Washington Blvd., St. Louis, Mo.

Dr. H. F. Cassel announces the removal of his office from 604-605 Humboldt Building to Suite 925-933 University Club Building, Grand and Washington, St. Louis, Mo.

Dr. John E. Taylor announces the removal of his offices to Suite 707-708 Hollywood First National Building, 6777 Hollywood Boulevard, Hollywood, California. Practice limited to orthodontia.

Dr. Josephine M. Abelson and Dr. Sidney E. Riesner, formerly with Dr. Martin Dewey, announce the opening of their joint offices at 120 East 39th Street, New York City. Practice limited to orthodontia.

Dr. Ralph Waldron, of Newark, New Jersey, wishes to announce that Dr. Richard A. Lowy and Dr. Eugene J. Kelly are now associated with him in the exclusive practice of orthodontia.

Dr. Benjamin M. Lanceet, formerly associated with Dr. Milo Hellman in the exclusive practice of orthodontia, announces the removal of his office to 70 Park Avenue, New York City. Practice limited to orthodontia.

Dr. Milo Hellman announces the removal of his office to 57 West Fifty-Seventh Street, New York City.

Dr. S. William Singer announces his association with Dr. Milo Hellman in the exclusive practice of orthodontia at the Professional Center Building, 57 West Fifty-Seventh Street, New York City.

Dr. Walter E. Wade announces the removal of his office to 363 Marlboro Street, Boston, Mass. Practice limited to Orthodontia.

Dr. James F. Hasbrouck, Dr. Armin Wald and Dr. Dudley C. Hughes announce the removal of their office to the Manhattan Life Building, 654 Madison Avenue, N. W. Corner of 60th Street, New York City. Practice limited to exodontia and oral surgery.

Dr. Douglas B. Parker announces the association in practice of Dr. Albin Robert Seidel. Practice limited to oral and plastic surgery. 121 East 60th Street, New York City.

Dr. Paul R. Stillman and Dr. Thomas E. Dwyer announce the removal of their offices to the 38th Floor, 551 Fifth Avenue, New York City.

Dr. Charles Vetter announces the removal of his office to 18 East 48th Street, New York City. Practice limited to extracting teeth, oral surgery, radiography and diagnosis.

Dr. Chas. S. McCowen announces the removal of his offices to Suite 411, Medico-Dental Building, Palo Alto, Calif. Practice limited to orthodontia.

